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JUNE 1945

Public Works

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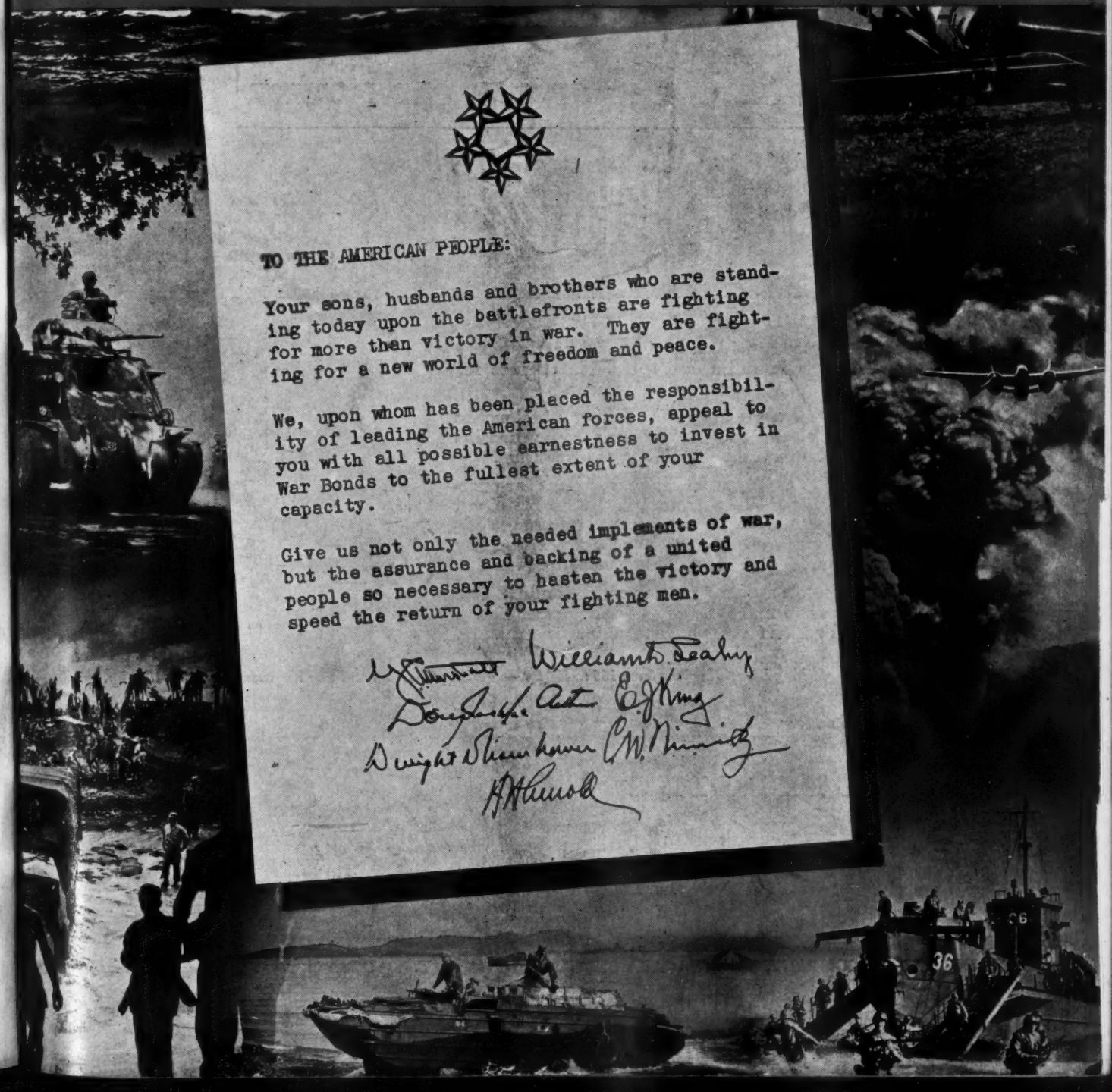

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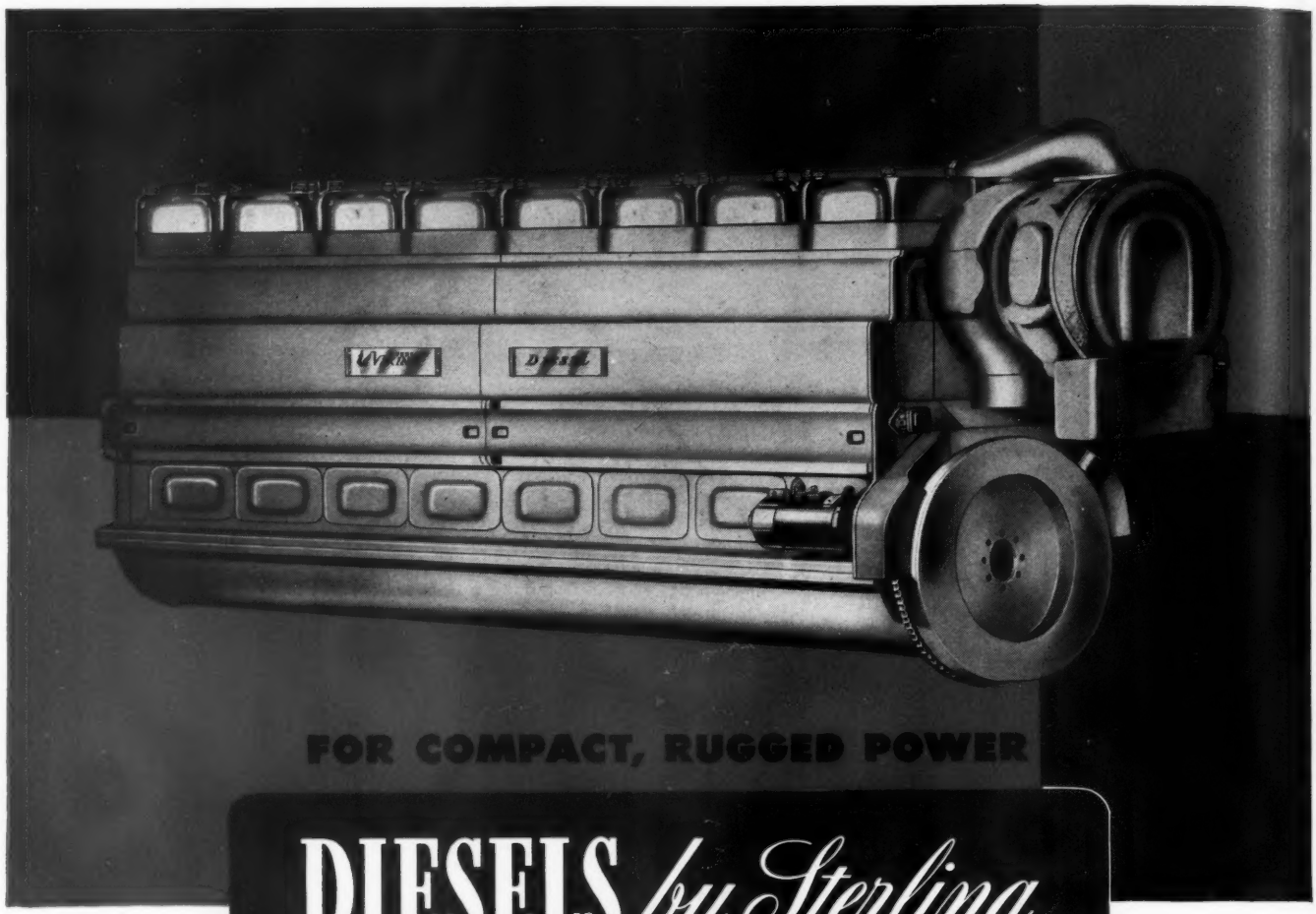

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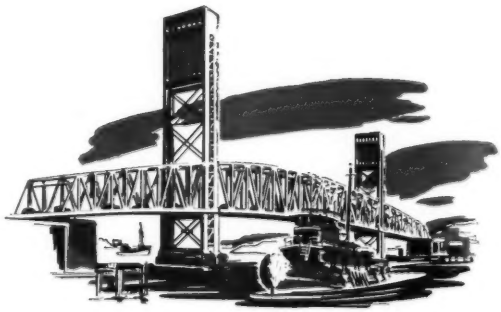

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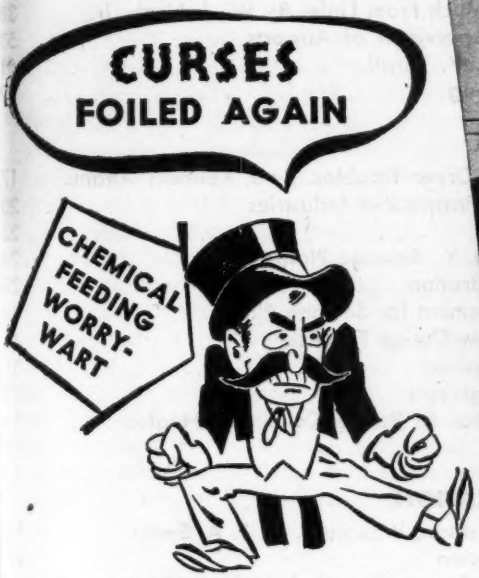

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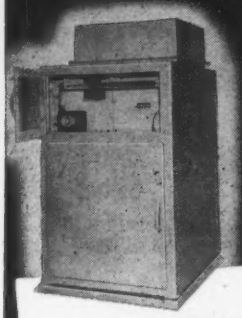

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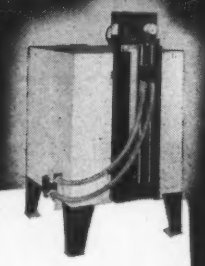

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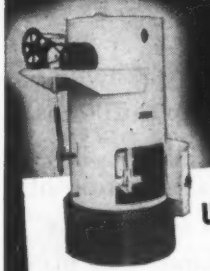

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Vol. 76 No. 6

A. PRESCOTT FOLWELL, Editor

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WAR and POSTWAR EMERGENCIES

Preference Rating for Sewerage Work

We are informed by M. D. Sullivan, Chief, Sewerage and Sanitation Section, WPB, under date of May 29th, of a revision of Preference Rating Order P-141.

The principal change in the Order relates to the increase from $1500 to $25,000 in the net material cost of sewerage jobs, *including buildings,* which can be built without War Production Board authorization. An AA-3 rating and the allotment symbol MRO-P-141 is assigned for materials for such construction. Buildings for sewerage systems were formerly controlled by Order L-41. A revision of that Order eliminates any reference to buildings so that such construction can be incorporated under P-141.

The AA-1 rating for materials and equipment for MRO purposes remains the same.

Another important change relates to the exclusion from the definition of inventory, paragraph (a) (11), of materials to be used for plant additions. On the basis of this change, we though it unnecessary to raise the $5,000 inventory limit now in the Order.

In view of the increase to $25,000, Form WPB-3445 formerly required under paragraph (g) (2) (v) is no longer necessary for the types of projects described under paragraph (g) (2).

There are a few other minor changes such as the omission of the provision in paragraph (g) (1) restricting the use of iron or steel pipe in house connections, and the omission in paragraph (f) (3) (iii) of the report when deliveries and withdrawals exceed the base period limits due to maintenance and repair occasioned by acts of public enemy, sabotage, explosion or by fire or flood.

Purchase of Surplus Federal Property

The Surplus Property Board has issued regulations giving Federal, State and local governments priorities in the purchase of surplus property, for a period of 30 days, after which the remaining property will be offered to commercial buyers. Governments holding WPB preference ratings will be entitled to preference over all others with equal or lower preference ratings during the periods of their respective priorities.

Under the regulation, Federal, State and local governmental agencies must provide statements of needs or estimated needs in order to exercise respective priorities. State and local governments will file their lists with the nearest regional or local disposal office of the disposal agency or agencies handling the types of goods it is desired to purchase. Form SPB-7 (4-13-45) for filing estimates of need may be obtained from regional offices. Although Federal, State and local governmental agencies are required to file statements of need their purchases are not limited to such items.

The larger part of highway equipment will be disposed of through the Surplus Property Department of the Department of Commerce. Some machinery may be disposed of through the Reconstruction Finance Corporation. List of regional offices of these departments may be obtained by writing American Road Builders' Association, International Building, Washington 4, D. C.

Relaxation of Restriction on Construction of Municipal Utilities

The Office of War Utilities on May 12 announced a number of major changes in Utilities Order U-1. Utilities can now construct additions involving up to $25,000 worth of materials (formerly $10,000) without restriction, revoking orders U-1-a, c, d, f, g and i. It also permits construction of plant improvements necessary to render service in accordance with "sound and economical operating standards" instead of "minimum standards" as before. However, to prevent undue stockpiling of materials that are expected to remain in short supply for some time, previous regulations of size of inventories and volume of materials that may be ordered are retained.

The priority rating of AA-1 for materials needed for maintenance and repair and as operating supplies is retained. Plant expansion involving materials costing between $10,000 and $25,000 is assigned an AA-3 rating. Plant expansion involving materials up to $10,000 retains the AA-1 rating of the old Order U-1 except that transmission and distribution materials, and meters, may only be rated AA-3.

A number of materials are now, and are expected to continue, in short supply. Among these, for example, are textiles, leather, containers, lumber and forest products, pulp and paper, many chemicals, tin, lead, cadmium, rubber, etc. Until the "cut-backs" begin to have substantial effect, other materials and products may remain in short supply. Metals, for example, will probably remain short for two or three months, while sheet steel may remain tight somewhat longer.

It must be clearly understood that the release of a W. P. B. control, or the lifting of a W. P. B. order, must not be considered as giving any assurance that all of the materials required to produce a product will be available.

Federal Funds for Postwar Planning

The Federal Works Agency has designated the Bureau of Community Facilities to administer the $17,500,000 fund appropriated by Congress to aid states and their political subdivisions in the advance planning of postwar public works. Applications for advances from the fund are to be made through the eight division offices of the Bureau of Community Facilities. Advances are to be repaid when funds become available to the applicant to construct the specific public work for which the advance was made. There will be no interest charge on any advance. Advances will not be approved to reimburse an applicant for any

(Continued on page 63)

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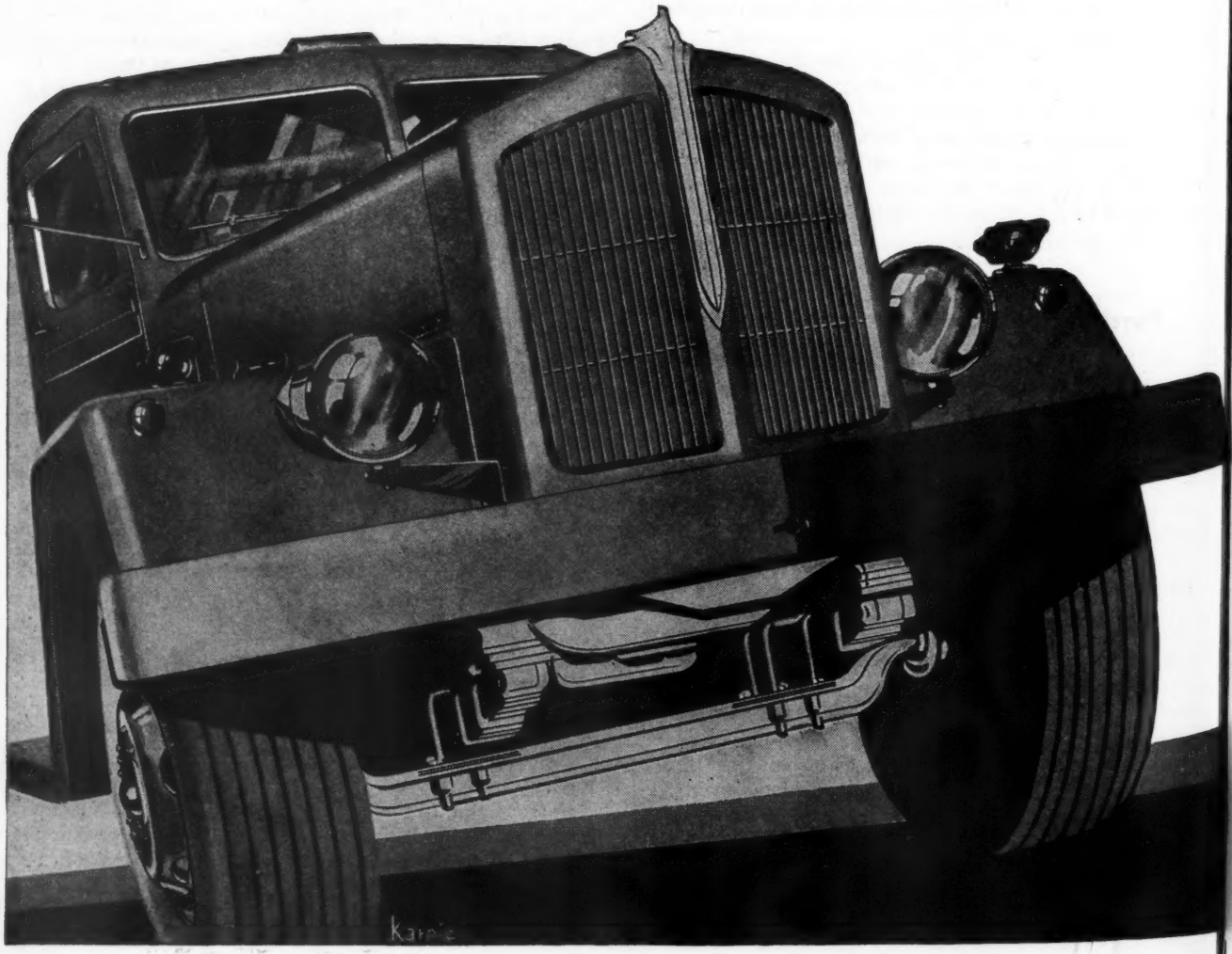

When you need special information—consult the classified **READER'S SERVICE DEPT.**, *pages 73-75*

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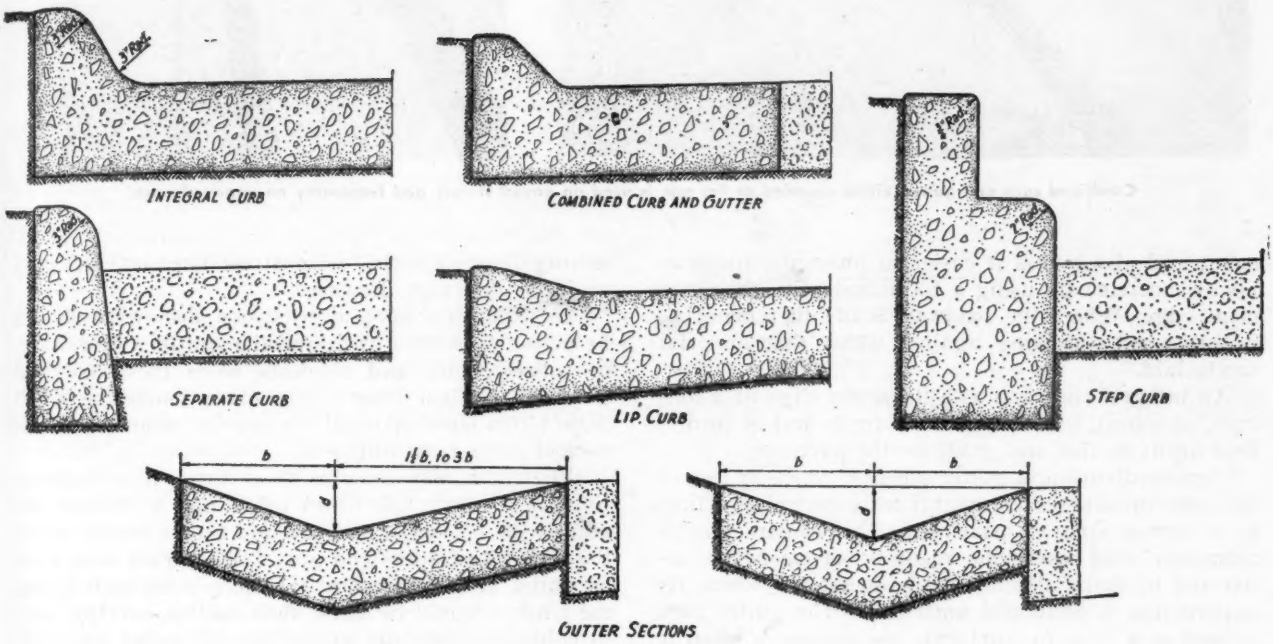


A few typical cross-sections of integral and combined curbs and gutters.

Constructing Concrete Curbs and Gutters

Various types of curbs and gutters, integral and combined, and conditions for which each is most suitable. Mixing and placing concrete, forms, curing and other construction details.

CURBS and gutters may be constructed either separately or combined; or a curb may be built integral with a concrete pavement, with no special gutter construction. The last, called integral curb, may be very low, merely high enough to keep water from flowing off the edge of the pavement (usually on country roads, to prevent washing of shoulders), when it is called lip curb. Or this same purpose may be served by separate gutters or depressed channels along the edges of the pavement. Lip curbs and separate gutters are essentially features of highway construction; the others of city streets or wherever sidewalks or parkways are constructed adjoining roadways.

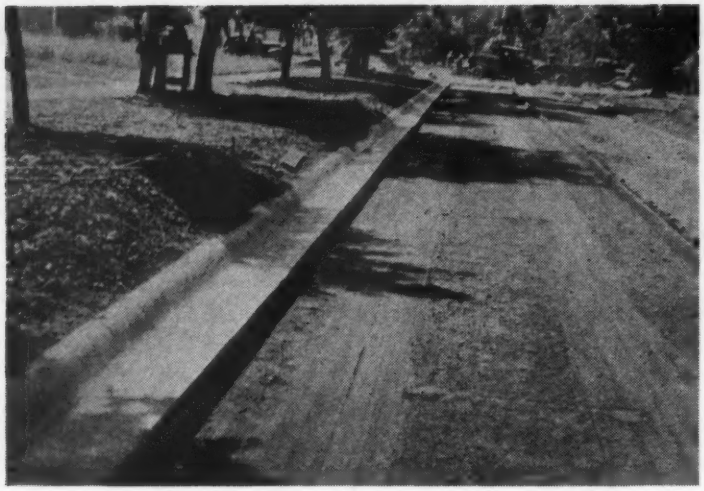
Curbs should not ordinarily be lower than about 4" nor high enough to damage the fenders or running boards of cars. If a height greater than 9" is necessary, a form of step curb should be used.

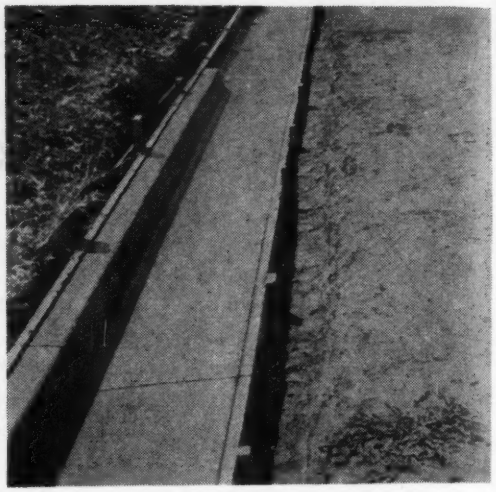
A curb with a sloping face and well rounded edge is unlikely to damage tires, and encourages drivers to park close to the curb, thus adding to the effective width of the street. Curbs with a face in shape of a reverse curve extending from the back of the curb to the gutter are easily shaped during construction, are attractive in appearance and require no opening for driveways. This design is suitable for integral curbs or for combined curbs and gutters.

Curb radii at corners should be about 20 ft.; a shorter radius may be necessary at an alley or private driveway, but requires vehicles turning the corner to swing out into the center of street, endangering traffic.

Types of Curbs

Separate curb is frequently built after the roadway pavement has been completed. This makes it possible to haul the materials for construction over the pave-





Combined curb and gutter, either rounded or flat top, is used on paved streets and frequently on unpaved ones.

ment, and also makes it easier to finish the roadway (if of concrete) by using a form flush with the pavement edge. Where the roadway is of other material, it serves as a backing against which that material can be laid.

An integral curb acts as a thickened edge of a concrete pavement, increasing its strength, and in turn is held firmly to line and grade by the pavement.

Combined curb and gutter possesses more or less of the same advantages as integral curb, the gutter acting as a narrow strip of pavement. This construction is commonly used where the roadway pavement is constructed of material other than concrete or where its construction is postponed until later. The gutter then is used as a form for surfacing the pavement when it is constructed.

The separate curb has several disadvantages over the integral curb or combined curb and gutter. The pressure of the earth behind it tends to cause it to revolve about the surface or base of the pavement as a fulcrum, which must be resisted by extending it below the fulcrum for a depth somewhat greater than its height above it. This greatly increases the amount of concrete used. Also the joint between the face of the curb and the pavement may be forced open by frost, by vehicles backing against it or otherwise, permitting the gutter water to seep into the base and weaken it. Possibility of the latter can be lessened by tying the curb and slab together with short hooked bars.

Separate Curbs

Separate curbs are ordinarily made 18″ to 24″ in overall height with the exposed face usually 5″ or 6″ high, 5″ to 7″ wide at the top (measured from the back to the plane of the face of the curb) with the back vertical and the front so sloped as to give a bottom width of 6″ to 10″. A 2″ flat top with a curve taking up the remainder of the top width is recommended by the Portland Cement Ass'n. With such a curve, or with the face so battered that wheels do not strike the top edge, no protection bar is required. Where such bars are used, they should not extend across any kind of joint.

Curbs are divided by joints into entirely separate blocks 6 to 10 ft. long. If the curb is tied to the pavement, the curb joints must coincide with those of the pavement.

Expansion joints ½ to 1 in. wide are used at the ends of all returns (curved portions connecting intersecting lines of curbs, as at street intersections) and at 50 ft. intervals elsewhere.

An expansion joint at least one inch wide should be placed between a curb and the end of a crosswalk, or between curb and sidewalk when these are laid adjacent to each other. This space should be filled with bituminous material to prevent stone or hard-packed earth from filling it.

Where the soil contains free water it is common practice to put a tile drain below and a little to the rear of the bottom of the curb and fill the trench under the curb with cinders and gravel. The drain must have an outlet at the low point. If there is no such drain, the cinders would be worse than useless, serving only to hold the water and soften the soil under the curb.

Integral Curbs

Being built as an upward extension of a concrete pavement or base, there is no joint along the gutter and the joint between curb and gutter can be rounded, and there is no trench to be dug below the concrete slab. The only joints in the curb are extensions of the transverse joints of the pavement.

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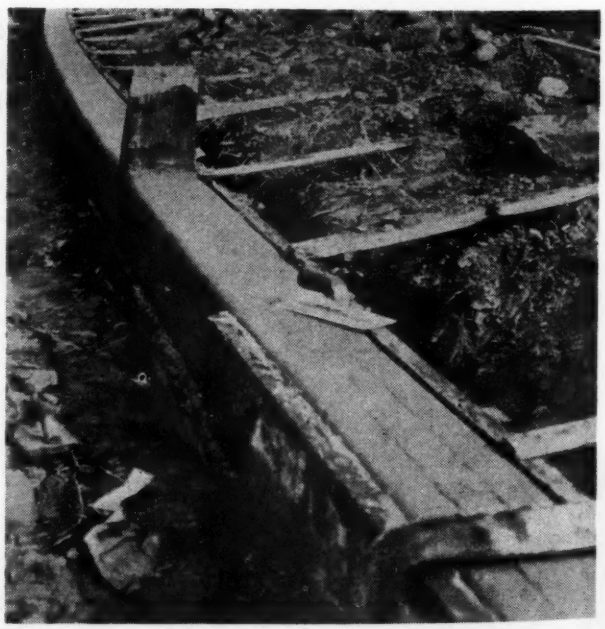


Separate curb construction. Front form has been partly removed to permit finishing and one spacer plate is partly withdrawn.

Overcoming Some Incinerator-Dryer Troubles

Details of arrangement for obtaining from a garbage incinerator the heat for a flash dryer, and discharging the exhaust air from the latter into the incinerator.

By J. KENNETH ADAMS
Superintendent of Sanitation Department, Tenafly, N. J.

THIS is an account of how an annoying problem involving heat was solved easily and inexpensively. It took several weeks of experimenting before we diagnosed the trouble but the remedy was simple and complete.

At the Tenafly, N. J., sewage treatment plant we dewater our excess activated sludge on Oliver vacuum filters followed by a Raymond Flash Dryer. The heat for the dryer is obtained by suction from the combustion chamber of a Pittsburgh-Des Moines garbage and rubbish incinerator. Usually there is enough heat from this source, but when the rubbish is insufficient in quantity or is too wet, we obtain the heat from a Ray oil burner, the flame from which flares out in the combustion chamber close to the intake duct of the flash dryer, (A) on sketch.

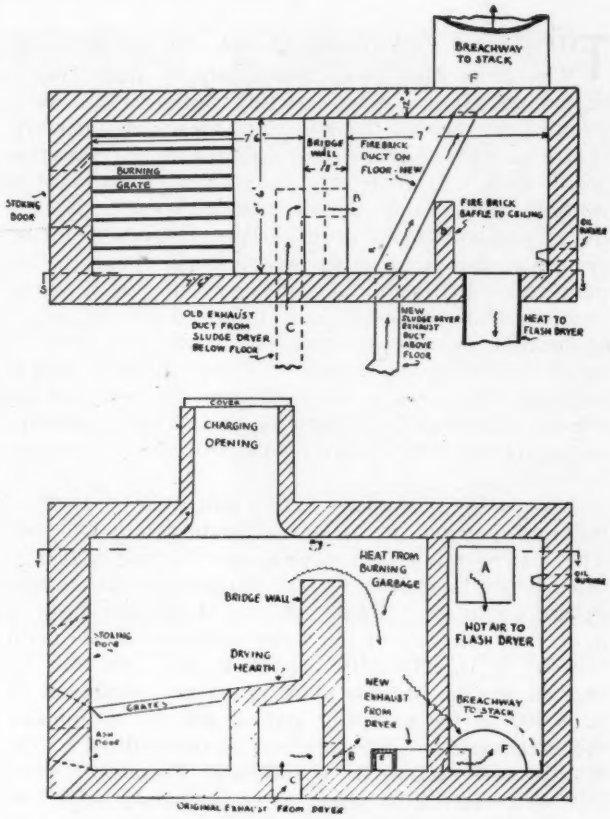
The oil burner cannot be used as an auxiliary source of heat when burning garbage because the waste gases from the incinerator smother the oil flame. Either source of heat must be used alone.

The hot gases from the burning rubbish come over the bridge wall and then pass diagonally down to the floor and across to the breachway on the far side of the chamber. The breachway is a horizontal passageway connecting the combustion chamber with the 75-foot stack.

Soon after the plant was built we found that, when burning oil, we could not hold a high enough temperature in the drying system because a lot of the heat was wasted. Instead of being drawn into the flash dryer, the heat was sucked up the stack through the breachway. To correct this, we built a baffle wall (D) in the chamber from floor to ceiling opposite the oil burner and just beyond the duct leading to the dryer. This solved the problem.

Besides the water vapor and gases resulting from the incineration of the rubbish and garbage, the exhaust air from the sludge drying system discharges into the combustion chamber. This air carries with it a small amount of very fine sludge dust and a large amount of water vapor. The mixture enters the combustion chamber at about 250° F. and there mixes with the much hotter gases already in the chamber. This step is intended to remove any fine material or odor that might be carried through the drying system to the atmosphere. As the temperature of the combustion chamber ranges from 1200° to 1900° F. there is seldom any question of this being accomplished.

The original arrangement brought the exhaust gases and water vapor from the sludge drying into the bottom of the chamber at about the center of the bridge wall. (B).



Horizontal and vertical sections of incinerator. Top—Section on TT. Bottom—Section on SS.

The duct (C) leading from the exhaust fan to the furnace was below floor level and had two right angle bends back of the bridge wall. It was very difficult to keep it clean, particularly at one place where a pile of fine dust would accumulate; but the worst feature was that in wet weather, when the ground-water level was high, the duct would be nearly full of water and in bad storms completely under water.

To eliminate the occasional shut-downs due to this trouble with the duct we decided to discharge the vapor from the sludge dryer directly into the combustion chamber at a different location and above the floor level, at the point (E). But when operation was resumed we found that we could not hold the necessary drying temperature as well as with the old arrangement. In eliminating one difficulty we had created another. The new point of entrance of these cooler gases

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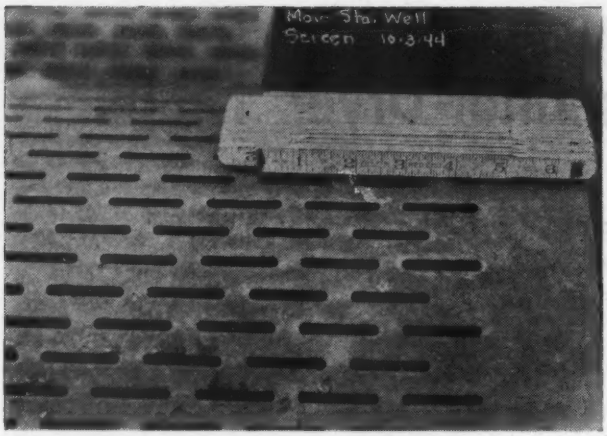


Spacing of slots in screen used.

Revamping Roc

By L. A. SMITH
Superintendent, Water Department, Madison, Wisconsin

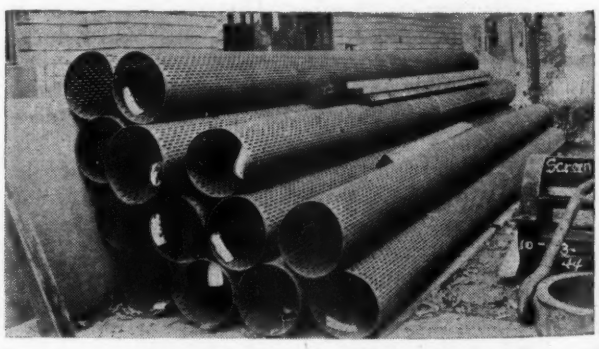
THE Water Department of the city of Madison, Wisconsin, obtains its water supply from twelve deep wells, eight of which are self-contained unit wells pumped directly into the system by means of electrically driven centrifugal pumps. The motors are constant-speed and it is extremely important to maintain a constant pressure in the distribution system so that the pumps will be operating at their highest point of efficiency. The four other wells, three of which are pumped by airlift and the fourth by a deep well pump, comprise the so-called station group and discharge into a common clear well, from which water is pumped into the distribution system by steam-driven pumping engines. The speed of these engines is controlled by pressure governors to absorb the variations of pressure in the system, thus permitting the unit wells to operate efficiently.

The combined capacity of the unit wells is 16,000,000 gpd and that of the station group 8,000,000 gpd. The main station well, which was the one that was repaired last summer, is the largest of the station group, having a capacity of over 4,000,000 gpd, or more than one-half of the water available at the main station. It is extremely important that this well be kept in service, because there is a total investment of $250,000 in the pumping station and its equipment, the effectiveness of which would be reduced over 50% if this well had to be abandoned. Therefore, when this well started to pump sand, we could afford to spend more money on its repair than would normally be justified to obtain this quantity of water. A capacity of at least 8,000,000 gpd was necessary in order that the main station could operate effectively in maintaining uniform pressure in the distribution system.

This well was located near the original station well, which was drilled in 1881 and was pumped practically continuously for a period of over fifty years. This original well had an 8″ drive pipe to a depth of 220 ft., below which there was an open hole of about 530 ft. through water-bearing sandstone. In 1934, this well was abandoned because the drive pipe had pitted through and the well was too small to furnish the amount of water required.

The new well, located within 20 ft. of the old hole, had a 30″ drive pipe set to a depth of 220 ft., inside of which was a 24″ well casing to a depth of 250 ft., and about 500 ft. of open hole in the water-bearing sandstone below this point. The annular space between the 24″ well casing and the 30″ drive pipe was filled with cement grout. This well was pumped by airlift, using an eduction pipe consisting of 250 ft. of 14″ pipe and 200 ft. of 15″ pipe. The capacity of the well was about 3,000 gpm, approximately four times that of the original well. This well discharged into a sand basin so designed that the major portion of sand which was pumped up with the water settled out, the water flowing from the sand basin through an open weir into the clear well. The long period of continuous pumping apparently washed out some of the cementing material which held the particles together to form sandstone, with the result that after the well had been in service five years it started to pump sand. An inspection in 1939 revealed that the lower 40 ft. had been filled up, and the well was taken out of service and the accumulated sand bailed out; after which it was restored to service and pumped continuously without any difficulty until November, 1943, when a cave-in occurred and such large quantities of sand were pumped up with the water that some of it got into the clear well. Measurements at this time indicated that the well had filled up approximately 50 feet. This sand was bailed out and the well returned to service. However, periodic cave-ins occurred so that in February, 1944, it had to be taken out of service because the quantity of sand pumped was too great to be settled out in the existing sand basin. During the four months prior to February, 1944, approximately 150 cubic yards of sand were removed.

It was clear that if this well were to be of further service, the discharging of sand would have to be eliminated. A study of this problem indicated the installation of a suitable screen with gravel packing between the screen and the open hole as the solution. In working out the details, several factors had to be considered. First of all, it was clear that if the screen were installed and the gravel packed back of it, it could never be removed and therefore the life of the



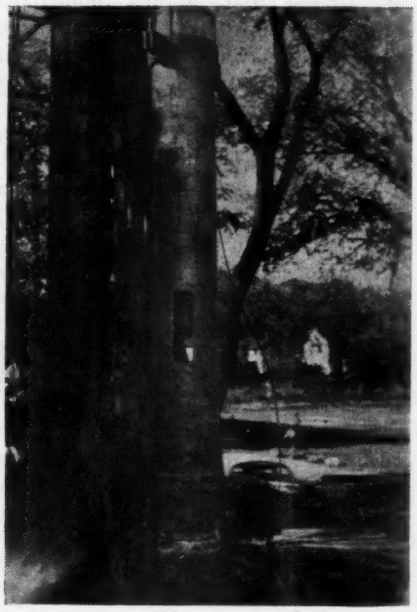
The entire shipment of the screen.

Rock Well in Madison, Wisconsin

How a well 720 feet deep, pumped by air lift, which was discharging sand, was provided with a new screen and gravel packing around it.

Welding screen sections together, using special jig.

Method of lowering screen with a well rig.



Slots in eduction pipe for feeding gravel outside of screen.

well would be dependent upon the life of the screen. The screen material finally selected for this purpose was Everdur metal, a copper alloy the life of which was estimated to be at least twenty five years. The screen is 12″ in diameter, with slots 1½″ long and 3/16″ wide.

Second, it was realized that the gravel which was to be placed around the screen might clog up at some time in the future and would probably have to be restored by acidizing. For this reason a granite gravel was selected, as this would not be affected by acid as would limestone or sandstone gravel. The gravel used was ½″-¼″, well rounded and graded, this size being selected so that it would not pass through a 3/16″ slot and yet be small enough to flow readily so that it could be placed properly.

The total depth of the hole to be developed was 720 ft., the eduction pipe being 450 ft. long and the screen 270 ft. The lower end of the screen was closed by a flat plate welded to it which rested on the bottom of the hole, which had been filled up to the proper point to form a cushion. However, the entire weight of the screen was carried by the eduction pipe, a clamp attached to the top of the eduction pipe resting on the well casing.

The sections of the screen were welded together with a special jig to insure true alignment, the welder tacking two sections together and then removing the jig to complete the welding. The connection between the 14″ eduction pipe and the screen was made by welding a 12″ pipe coupling on the lower end of the 14″ pipe and inserting in it a 12″ nipple which was welded to the top of the screen. This weld was the most difficult one of the entire job because of the fact that the welding rod used on the Everdur metal of the screen would not adhere to the genuine wrought iron eduction pipe, and the welding rod used on the wrought iron would not make a satisfactory weld on the Everdur. Finally, a bead was welded upon the wrought iron pipe with the proper welding rod, and another bead was welded upon the Everdur screen with the proper welding rod; and then the two beads were welded together with the welding rod used upon the Everdur metal. In order to be sure that such a weld would hold, a sample weld was made and tested and it was found to bend 180° cold without fracture and to develop the full strength of the Everdur metal, which was the weaker of the two. No. 20 Everdur bronze rods were used for welding the screen together and No. 25 M bronze welding rods for welding the

steel and making the connection between the screen and the wrought iron eduction pipe.

Gravel which was to surround the screen was fed through the eduction pipe, two slots 4″ x 16″ being cut in the pipe near the bottom for this purpose. To prevent the gravel from entering the screen, a cast iron plug was screwed into the 12″ coupling before the 12″ nipple was inserted, and was subsequently drilled out when the placing of the gravel packing had been completed.

A heavy sash weight on the end of a piano wire was used for ascertaining the elevation to which a measured quantity of gravel filled the hole, and to make sure that the gravel was not bridging but was actually reaching the proper location back of the screen. The quantity of gravel poured into the eduction pipe was measured by use of 50-gallon oil drums, reinforced with flat steel and provided with a bail. In view of the fact that 150 cubic yards of sand had been pumped out in the four months immediately preceding the repair and that before that time at least 50 cubic yards had been removed from the sand basin at various times, it was thought that at least 200 cubic yards of gravel would be required. However, only about 100 cubic yards was necessary. The explanation probably is that the sand had washed out in thin 12″ to 18″ layers that went back into the sandstone formation probably 10 to 20 feet, so that there were no large cavities at any one point, and that the gravel could not be forced back into such narrow cavities more than 3 or 4 feet.

After the gravel had filled up to the top of the screen, the annular space between the eduction pipe and the well casing was filled to provide an additional head on the gravel to force it back into the openings. To do this, it was necessary to cover the two 4″ x 16″ slots, which was done by using an 8 ft. length of 12″ pipe (which fitted very nicely in the 14″ eduction pipe), lowering it into the eduction pipe until it hit the nipple. After these slots had been closed, gravel was poured into the annular space above referred to until it was filled up to the surface of the ground. The airlift equipment was then reinstalled and the well pumped. It was started and stopped several times because starting and stopping a well causes considerable vibration which would tend to force the gravel further back into the openings. However, the gravel only lowered 8 ft. or so in the annular space. The well was then put back into service.

The cost of installing the screen and gravel packing was as follows:

1. 270 ft. Everdur screen	$4,560.67
2. Use of well rig and operators	3,573.21
3. Water Department labor	735.57
4. Gravel	581.12
5. Welding	214.33
6. Material from stock	63.92
7. Gasoline and oil	47.43
8. Transportation of supplies and other misc. items	198.38
	$9,974.63

The original pumping rate was 3,000 gpm. When the well was first put back into service, it was pumped at a rate of 2500 gpm with no evidence of sand. The rate of pumping was gradually increased until, when the pumpage was greater than 2800 gpm, a small quantity of sand began to come up. When the well was put in service permanently in November, 1944, it was pumped at a rate of 2700 gpm and has operated at this rate satisfactorily since that date. The effect of the screen and the gravel packing therefore reduced the safe capacity of this well about 10%, although the efficiency of the airlift equipment did not drop off materially, the quantity of air required being .4 of a cubic foot per gallon of water pumped.

The work was done by the McCarthy Well Company of St. Paul, Minnesota; the welding by the Howard Machine Company of Madison.

Waste Disposal Problems of Prospective Industries

A recent "News Letter" of the Georgia Water and Sewage Association says:

"If we can believe Chamber of Commerce predictions, the close of the war will bring a greatly accelerated industrial development program to Georgia. Many of these industries will require large amounts of water and will in turn discharge equally large amounts of industrial wastes which may create nuisance or public health problems of considerable magnitude.

"Many such wastes are not amenable to treatment in conventional sewage treatment plants and frequently the volume and strength of wastes from certain types of industries will be sufficiently great as to make the cost of construction and operation of treatment works beyond the financial ability of the municipality.

"Before making final commitments to new industries, any town will do well to investigate the industrial waste problems which may be created and enter into definite agreement with the industries concerning construction and operation of adequate treatment works."

This is a warning that cities in all states might well keep in mind.

Overcoming Some Incinerator-Dryer Troubles

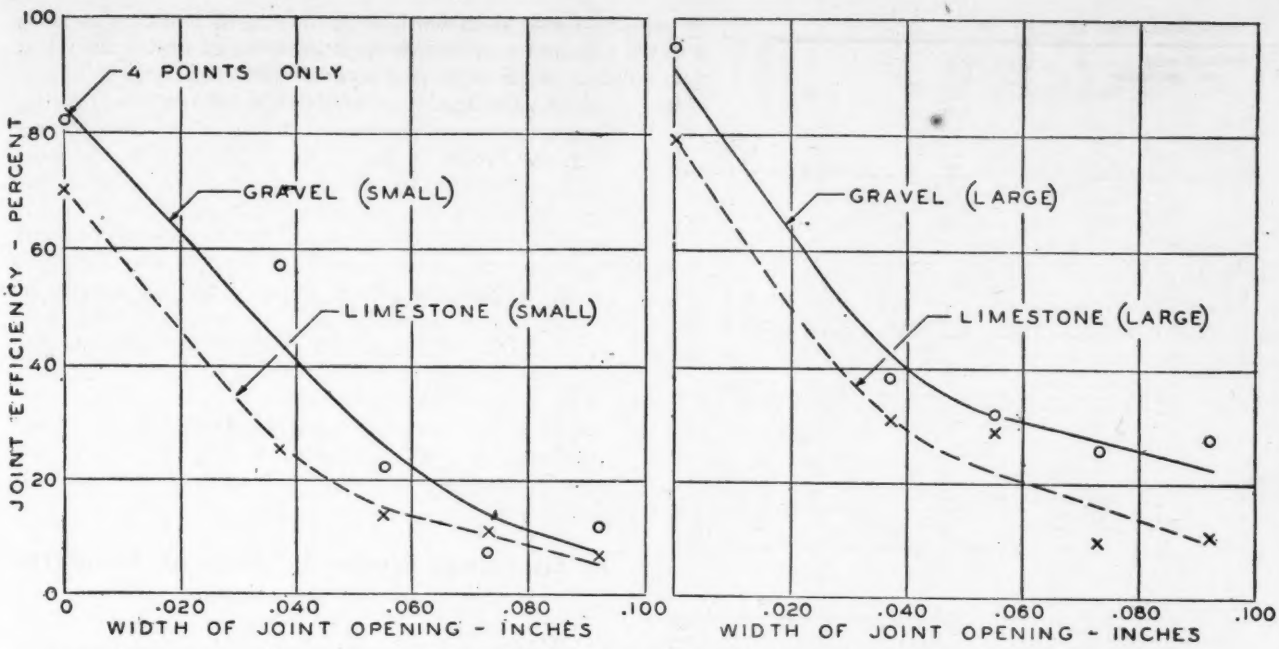
(Continued from page 17)

evidently caused currents to be set up in the combustion chamber which drew the heat away from the hot gas duct leading to the flash dryer.

We tried projecting the cooler gases into the combustion chamber at different distances from the wall by means of a fire brick tunnel and also tried several arrangements of fire brick baffles, none of which did any good.

But we were on the right track and when we finally extended the tunnel across the entire floor of the combustion chamber and just beyond the entrance to the breachway (F) leading to the stack, the problem was solved. This by-passed the combustion chamber and kept the water vapor and cooler gases out of it so that the normal heat from the burning garbage and rubbish was not reduced before it entered the sludge drying system. The new arrangement works perfectly and we have no trouble holding a temperature of 1200° to 1900° at the start of the sludge drying cycle.

It has been rather surprising that, in spite of the very large decrease in the amount of newspapers and magazines in the rubbish, we have noticed no important lessening of available heat. The Pittsburgh-Des Moines incinerator does its job well in converting garbage and rubbish to heat units, and now we think we have found the means of putting all the B. T. U. to work for us.



Effect of type of coarse aggregate on the relation between joint openings and joint efficiency as determined with edge loading.

Structural Efficiency of Transverse Weakened-Plane Joints in Concrete Pavements

Summary of a paper prepared for the Highway Research Board, National Research Council, by E. C. Sutherland, senior highway engineer, and H. D. Caskell, associate highway engineer, Public Roads Administration.

EXPERIMENTAL concrete pavements, each several miles long, were built three or four years ago by the California, Kentucky, Michigan, Minnesota, Missouri and Oregon highway departments and the PRA. In these the expansion joint spacing varied from 120 to 5280 ft. All of the plain concrete sections have transverse contraction joints at intervals of 15 to 25 ft., and the reinforced sections have expansion joints at 120 ft. spacing with one intermediate contraction joint. In general, load transfer devices were used in all expansion joints but were used in only part of the contraction joints of a given project, in order to determine whether or not load transfer is needed with closely spaced contraction joints of the weakened-plane type.

Measurements and observations of these pavements have been made regularly; and, while it is thought to be too early to draw final conclusions regarding the merits of the different designs, the following tentative indications appear:

1. Where expansion joint fillers of a plastic type are used, there has been a progressive closing of the expansion joints and a progressive opening of the contraction joints with time. The greatest progressive change in the width of the joints occurs during the first year after the pavement is laid and it appears to continue so long as there is expansion space available. The magnitude of the progressive opening at the contraction joints appears to be related to the spacing of the expansion joints, being less for the greater expansion joint spacings.

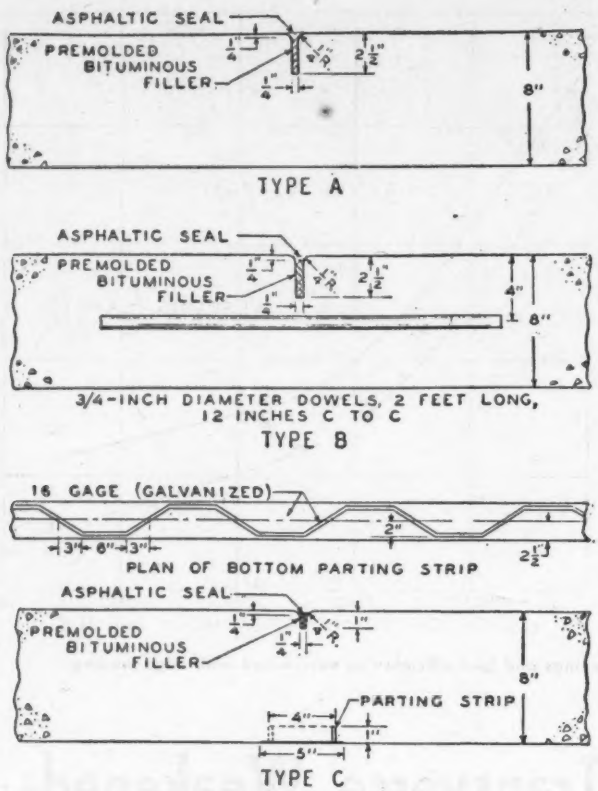
2. Wood expansion joint filler as used in one project appears to restrain the progressive changes in joint width.

3. The seasonal changes in width of the contraction joints seem to increase as the spacing between these joints is increased, but this variation may not be linear if the expansion of the pavement is restrained during periods of high temperature.

4. In pavements laid at temperatures less than those which normally occur in the summer, the seasonal changes in the widths of the contraction joints seem to be less in pavements with limited expansion space than in pavements with greater expansion space.

5. While a limited amount of faulting has been noted in some of the pavements, the amount is not sufficient to justify any conclusions regarding the necessity for the use of dowels to prevent faulting in weakened-plane joints.

As an integral part of the general investigation, the effectiveness of aggregate interlock for reducing the critical stresses caused by loads, acting in the vicinity of weakened-plane joints, has been studied by the Public Roads Administration on a test pavement



Designs of Weakened-plane joints considered.

near Washington, D. C. This pavement consisted of six 30- by 20-foot sections of 8-inch uniform thickness, each divided longitudinally by a deformed metal plate center joint and transversely by a weakened-plane joint. The type and maximum size of coarse aggregate in the concrete was varied in the different sections so that the effect of these variables on the efficiency of weakened-plane joints might be studied.

In making the tests to determine the efficiency of the joints, loads were applied at the joint edges, free edges and at the interior of the slabs and the critical strains caused by these loads were measured. Tests at the joint edges were made with the joints in a closed condition (under compression) and at various controlled openings.

It was found that all of the weakened-plane joints were effective in reducing the critical load stresses when closed and under compression, but that aggregate interlock was not a dependable method of stress reduction when the joints were open small amounts.

English Experiment With Reinforcing Pavements

The laboratory of the Road Research Board, England, has for years been conducting research into the quality of concrete. In a paper read before the Institution of Municipal Engineers on March 9, 1945, several more or less tentative conclusions from this research were presented. One of these referred to "the evidence for and against the use of reinforcement in concrete road slabs," concerning which the paper stated:

"This is a matter on which there is considerable conflict of opinion; and even now, because it involves so many factors, a clear-cut answer cannot be given. It is, perhaps, of interest to note, however, that a recent analysis of the cracks in the Ministry of War Transport's experimental loop road on the Colnbrook by-pass has shown that the degree of cracking in slabs with top and bottom reinforcement is considerably less than when a single layer is placed at either top or bottom; and the latter type in turn shows less cracking than when no reinforcement at all is provided. Moreover, the nature of the cracks is different. In the slabs reinforced at top and bottom all the cracks were fine ones requiring no maintenance; in the slabs with one layer of reinforcement some of the cracks were of medium size, extending right through the slab and requiring periodic filling and sealing; when no reinforcement was provided, most of the cracks were wide structural failures requiring considerable maintenance. These effects appeared in slabs both 30 ft. long and 45 ft. long. While, however, the results are quite conclusive in relation to the particular conditions of the Colnbrook by-pass experiment, it is not by any means safe to assume that they are capable of general application."

To Encourage Uniform Technical Standards in the Americas

Formation of a planning committee to make recommendations for an intensified program to encourage adoption of uniform technical standards throughout the Americas, as an aid to industrial development and trade, has been announced by the Inter-American Development Commission.

Organizations represented on the planning committee are the Pan American Union, Department of Commerce, Department of State, American Standards Association, and the Inter-American Development Commission.

Inter-American industry and trade stand to benefit by the adoption of uniform standards, particularly in such fields as electrical equipment, factory and industrial machinery, and transportation. When uniform technical standards do not exist in these and hundreds of other industrial and commercial categories, trade and industry are handicapped inasmuch as equipment and other products of one country cannot be used in another.

The planning committee will consider plans for an aggressive standards program with both private and governmental participation throughout the 21 American republics. The committee also will recommend the establishment of the Pan American Standards Committee, to be made up of three representatives of each of the 21 American republics and to function under the auspices of the Inter-American Development Commission with the cooperation of the Pan American Union and the Union of South American Engineers.

The American Standards Association for over two years has been cooperating with established standardizing organizations in Brazil, Argentina, Uruguay, and Mexico, as well as business concerns, governmental officials and others throughout the Americas in the promotion of uniform technical standards.

A Filter Problem and Its Solution

In the article with this title which was published in our May issue an unfortunate omission occurred—the title of the author and the name of the city which he serves.

Mr. Behan is Filter Plant Operator at Plattsburg, N. Y., and the plant referred to in the article is located there.

This information was given in the head of the article as set up, but in some mysterious way was lost in making up the paper.

Catch Basin Capacities

Method of calculating the amount of surface water that can enter a grating in the plane of gutter pavement, as used by the Los Angeles Bureau of Engineering.

AMONG the papers prepared for the 1945 meeting of the Highway Research Board (which meeting was cancelled) was done by W. I. Hicks, civil engineer, Bureau of Engineering, Los Angeles, Calif., entitled "Runoff Computations and Drainage Inlets for Parkways in Los Angeles." The latter part of this paper is given below.

The fact that high-speed traffic does not admit of the use of local depressions in the paved roadway at catch basins, seriously impairs the efficiency of all types of inlets. Not only is it impossible to narrow the width of the gutter flow stream preparatory to entrapping it, but, in the case of locations at sags in grade, a depth at the catch basin greater than that in the normal gutter flow section cannot be used for creating additional head in front of side-opening catch basins, as to do so would spread the water to greater widths in the traffic area. The roller gutter and any gutter section which does not have a nearly vertical curb face prohibit the use of side-opening basins.

The capacity of side-opening catch basins, in the rare instances where they can be used advantageously, is determined with the equation

$$L_{CB} = \frac{0.33Q}{0.5\,(d_u + d_L)}\,1.5 \qquad (7)$$

in which d_u and d_L are the depths of the water at the curb in feet above and below the catch basin, and L_{CB} is the length of the catch basin opening in feet. This equation is theoretical and without sufficient flow measurements to substantiate it.

The grating catch basin used locally consists of a grating with bars parallel to the curb set in a steel frame over a concrete catchment box. The net length of opening parallel to the curb is 3 feet; the gross width of opening is 24" with fifteen ½" x 3½" steel bars, spaced 1" clear from each other, which makes the net width of opening 16½".

The capacity of the grating catch basins is based on the equation for freely falling bodies,

$$F = \tfrac{1}{2}\,gt^2 \qquad (8)$$

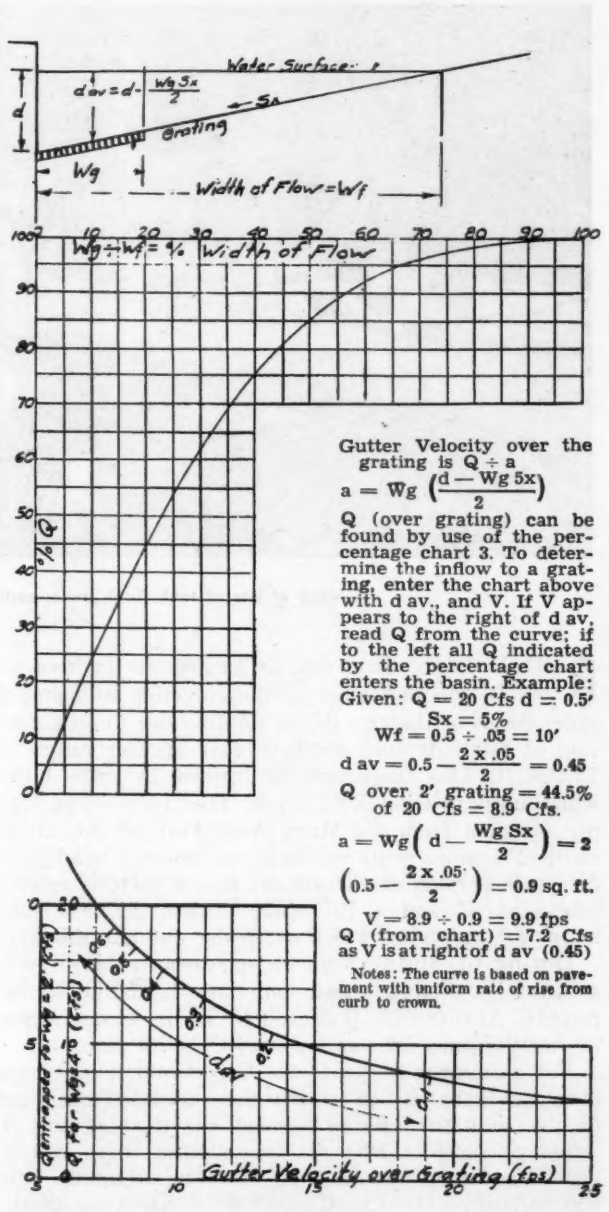
The water in the gutter flowing above the grating tends to fall into the basin. Free fall is hindered in three ways:

1. Frictional resistance develops between the bars.
2. The bars reduce the gross width by one-third so that a part of the water tends to skid along the top of the bar until it can fall to either side.
3. If the velocity of the segment of water over the grating (V_H in feet per second) is great enough, the upper layer will overshoot the basin and continue on down the gutter.

To account for the first two items, the length of the basin is assumed to be 1.5 feet, which makes the time $\frac{1.5}{V_H}$ and transforms Eq. 8 into

$$F = \frac{36.18}{V_{H2}} \qquad (8a)$$

(Continued on page 26)


Water Surface
d av = d - Wg Sx / 2
Sx
d
Grating
Wg
Width of Flow = Wf
Wg ÷ Wf = %
Width of Flow
Q %
Gutter Velocity over Grating (fps)
Gutter Velocity over the grating is Q ÷ a
a = Wg (d - Wg 5x / 2)
Q (over grating) can be found by use of the percentage chart 3. To determine the inflow to a grating, enter the chart above with d av., and V. If V appears to the right of d av, read Q from the curve; if to the left all Q indicated by the percentage chart enters the basin. Example:
Given: Q = 20 Cfs d = 0.5'
Sx = 5%
Wf = 0.5 ÷ .05 = 10'
d av = 0.5 - 2 x .05 / 2 = 0.45
Q over 2' grating = 44.5% of 20 Cfs = 8.9 Cfs.
a = Wg (d - Wg Sx / 2) = 2 (0.5 - 2 x .05 / 2) = 0.9 sq. ft.
V = 8.9 ÷ 0.9 = 9.9 fps
Q (from chart) = 7.2 Cfs as V is at right of d av (0.45)
Notes: The curve is based on pavement with uniform rate of rise from curb to crown.

Effect of gutter velocity on capacity. Grating in plane of pavement.

Coarse-Filtering a Mountain Stream

How an intake was constructed for intercepting clear, cold water from a mountain stream after filtering through coarse sandy soil.

View of site of tank. Tank under construction at right. Old gate chamber at left.

RED LODGE, Montana, is located at the foot of the Beartooth Range at the elevation of about a mile. South of the city the mountains rise to an elevation of 8,000 ft. and south of that another range to 11,000 ft. This large area is drained by three forks which unite to form Rock creek. The city's water supply is taken from the Main West Fork of this creek about 2½ miles south of the town, where a head gate diverts a portion of the stream into a valve chamber, where an 8″ and a 10″ valve control the flow into mains of those sizes which carry the water to the city.

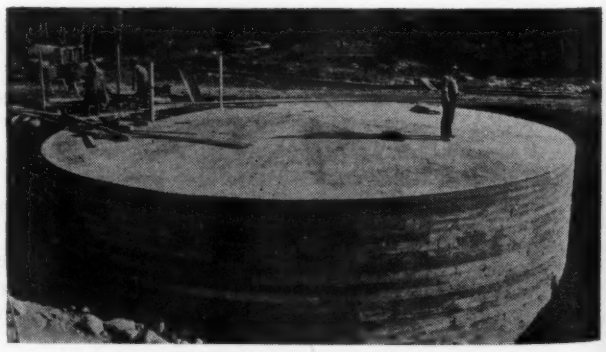
During the spring high-water season, rubbish such as dead leaves, brush and sometimes landslides cause trouble. Also trouble is caused by ice in winter, when the temperature falls as low as 40° below zero.

For a number of years the City Council has been trying to learn how to remedy these troubles, but none of the solutions offered seemed practicable until a sanitary engineer who was vacationing here a few years ago suggested the one that was adopted. This was to build a deep tank about 40 ft. from the creek, into which creek water could filter through the coarse sand and rock of which the ground there is composed, and from which the water would enter the two supply lines to the city.

Unfortunately this engineer died of a heart attack a few days after submitting his report and the matter was dormant until the State Board of Health insisted that something be done (although no case of typhoid has ever been attributed to this water) and the writer was asked to prepare a definite plan of this project, which was constructed in 1944.

A number of test pits dug at the site selected showed water in all of them standing at creek level, so that a plentiful supply reaching the tank was assured.

The design called for a circular tank 40 ft. inside diameter, with the wall 14 ft. high above the footing and a concrete slab roof supported by a post at the center, where it is 18″ higher than at the tank wall. At the outlet side of the tank, against the outside of the wall, is constructed a valve chamber, on top of which and extending about 7 ft. into the tank is a head house, the floor of which is about 15″ below the roof



Tank roofed. Gate house corner posts at left rear.

r Red Lodge, Montana

By W. P. BURKE
County Surveyor, Carbon County, Montana

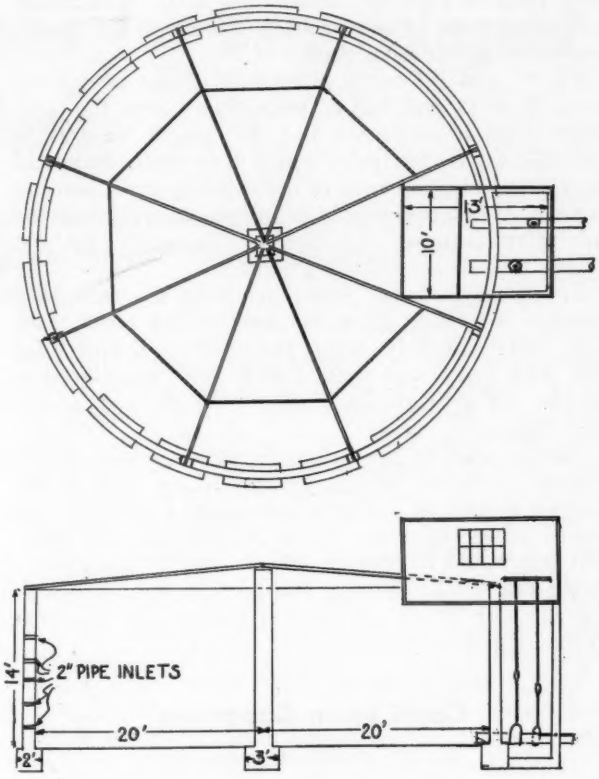
W. P. Burke

of the tank. An 8″ and a 10″ pipe pass through the bottom of the tank wall into the valve chamber, and continue from the valves through the outer valve chamber wall to connect to the existing supply lines to the city. All construction is of reinforced concrete, with steel beams used to support the roof and as a frame for the house.

The first construction was a footing 2 ft. wide by 3 ft. high to support the wall. For two-thirds of the circumference nearest to the creek, 2 ft. openings were left in the footing at 5 ft. intervals and filled with coarse gravel to allow water to enter the tank. On this was constructed a 10″ wall, into which were built 252 pieces of 2″ pipe extending through the wall at 2 ft. centers to high water elevation, to admit water to the tank. The inside form for the wall was built complete and the reinforcement placed. The outside form was raised a few feet at a time as the concrete was poured. The concrete was a 1:2:3.5 mix, poured continuously until the wall was completed. It was mixed with a rebuilt 2/3 cu. yd. mixer and placed by wheelbarrows, giving sufficient time to work it well into the form as it was poured. The wall extends one foot above the ground surface. At eight equidistant points around the circumference, ¼″ x 6″ x 10″ steel anchor plates were embedded in the top of the wall, to which the roof beams were to be welded.

Meantime the center post 18″ square on a 36″ square footing had been built, capped with an 18″ square steel anchor plate. Eight 4″ heavy I-beams extending from the center post to the anchor plates on the wall were placed and welded to the plates. These beams were connected by eight 3″ heavy angles 5½ ft. in from the wall, to help support the 6″ concrete roof slab. The vertical wall reinforcing rods extended above the top of the wall and were bent over to tie the roof to the wall. All steel joints were electric welded.

Before the roof was poured, the steel outline for the gate house was set and welded. At this point the wall was left 15″ low for a width of 10 ft. In this depression was set a floor frame 14 ft. x 10 ft. of 4″ I-beams welded together. At each corner of this was welded a vertical 4″ angle 7½ ft. high, forming the corner posts, and these were tied together at the tops by



Top view and section of tank.

Channel draining site of tank.

Gate house completed.

other 4″ angles. These supported the 6″ reinforced concrete walls of the house and its slightly arched roof. The house extends out 6 ft. from the tank wall and its floor serves as the roof of the valve chamber, which is a 4½ ft. by 6½ ft. shaft of concrete 13½ ft. deep. In the house floor, above each valve, was set vertically a 2½ ft. length of pipe through which the valve stem extensions pass. When the time came to place these, it was found that the valves did not line up correctly with these guide pipes; but by cutting the rods in two about 3 ft. from the bottom and inserting in each an automobile universal joint, the valves can be operated perfectly. In each side wall is a steel window frame holding eight 10″ x 12″ wire netted window panes.

Instead of digging a hole 17 ft. deep for the tank and attempting to keep it dewatered by pumping during construction, the site was drained by excavating a trench about 350 ft. long, starting at the level of the tank floor and ending where the ground level is a foot or two lower. The trench and the excavation for the tank were dug by using a ¾ yard Speeder Rig with drag line boom and bucket. Over 5,200 cu. yd. of coarse sand, gravel and boulders were removed and deposited on the bank, from which it was moved back from time to time by means of a RD-7 Caterpillar bulldozer. Some of the boulders were so large that it was necessary to shoot them.

The 8″ and 10″ outlet pipes were of cast iron. Each had a Y 96 ft. and 100 ft. respectively from the tank, from which it continued at a 45° angle for 160 ft. and 172 ft. respectively, where they were connected by Y's and eighth bends to the existing pipes leading to town. When this supply is in use, the valves in the old valve chamber are closed. Ultimately the old supply will be cut off altogether.

To insure sufficient water reaching the tank, two trenches were dug from the tank to the creek, each 5 ft. wide and 3 ft. below the creek bed, and filled with rock and coarse sand. Coarse rock was placed as backfill for a height of 5 ft. around the part of the tank facing the creek.

The backfill in the drainage trench would be too porous to permit holding water in the tank to the desired height, so a wall of bentonite 2 ft. thick was placed across the trench in the backfill; the idea being that this would be washed into the soil by the ground water and swell to several times its volume, thus sealing the soil. There are several deposits of bentonite in the vicinity and its cost was not great.

Catch Basin Capacities

(Continued from page 23)

When the average depth of segment of water at the upper end of the grating is less than F, the whole segment is assumed to be entrapped; when the depth is greater, the fraction of the segment, $\frac{d_{av} - F}{d_{av}}$, is assumed to flow past.

While the methods of computation for grating basin capacity are analytical, observation during rainstorms confirms them for the higher-gutter velocities. For comparatively low velocities, where the water in the segment over the basin drops below the top of the grating bars before the lower end of the grating is reached, some additional water will side slip into the basin. For basins in sags, where the gutter slope is necessarily low on account of the vertical curve, flow from the gutters on both sides will enter the basin in addition to some side slip flow.

Observation of the action of grating basins shows that they are vulnerable to partial stoppage by debris. Grass clippings and other fine debris, carried either by the low velocity of flat grades or the first flush of water after a prolonged dry period, build a mat at the upper end of the grating which increases in size and usually stays in place until the rainstorm is over. In local designs for standard streets, it has been possible to avoid this condition by placing a side-opening upstream from the grating; in the case of parkways, the problem must be solved either by careful maintenance or by a combination of maintenance and the introduction of a factor of safety.

Notes Concerning Cortland, N. Y. Sewage Plant

Cortland, N. Y., population about 15,000, treats sewage of which less than 25% is accounted for by the water consumption of 93 gal. per capita, the remainder resulting from infiltration of ground water into the sewers. The treatment consists of prechlorination, passage through both mechanically and hand cleaned bar screens, and a screenings grinder; pumping to duplicate grit chambers, the flow being measured with a Parshall flume; sedimentation in duplicate tanks, and post chlorination. The sludge is digested in two tanks and pumped to two vacuum filters, from which it is removed by belt conveyors.

In his annual report, Uhl T. Mann, superintendent of the plant, described in detail the procedures followed and results obtained, including some problems that had to be solved. The amount of sewage treated averaged 6,038,000 gpd, varying from 9,460,000 to 3,140,000.

The grit chambers were provided with ejectors to raise the grit and force it to a lagoon through a pipe line. But the length of this line is so great that the ejectors can not overcome the back pressure. It is planned to construct (after the war) a welded metal grit box which will be movable on a track; the grit can be lifted into the box for washing and the box then run to the end of the settling tanks and there dumped into a truck. Meantime unwashed grit is shoveled into a wheelbarrow and dumped and covered with dirt to prevent nuisance.

Each digester is equipped with heating coils and a scum jetting device, and a gas dome. "With our type of fixed cover digesters it is better practice to keep the liquid level at its maximum to prevent loss of gas through a construction joint near the top of the tanks. These joints are liquid tight but not always gas tight."

"The superstructure of the floating cover gas holder has been damaged on two occasions by high wind while the cover was at its maximum height. Twisting of the superstructure by the wind caused the cover to bind with the result that greater pressure was required to lift it. When the pressure exceeded 12 inches of water the pressure relief valves on the holder and the digester gas domes operated to cause a considerable loss of gas. By operating the gas holder at about 50% of its capacity there has been no recurrence of this trouble. Since the gas holder was used at only ½ capacity during the year, the pressure at the meters remained constant at 6 in. water. When the holder is used at capacity and is full it is possible for the pressure to rise to 9 in. at which time the pressure relief valve in the line to the waste gas burner operates to permit surplus gas to pass to the burner."

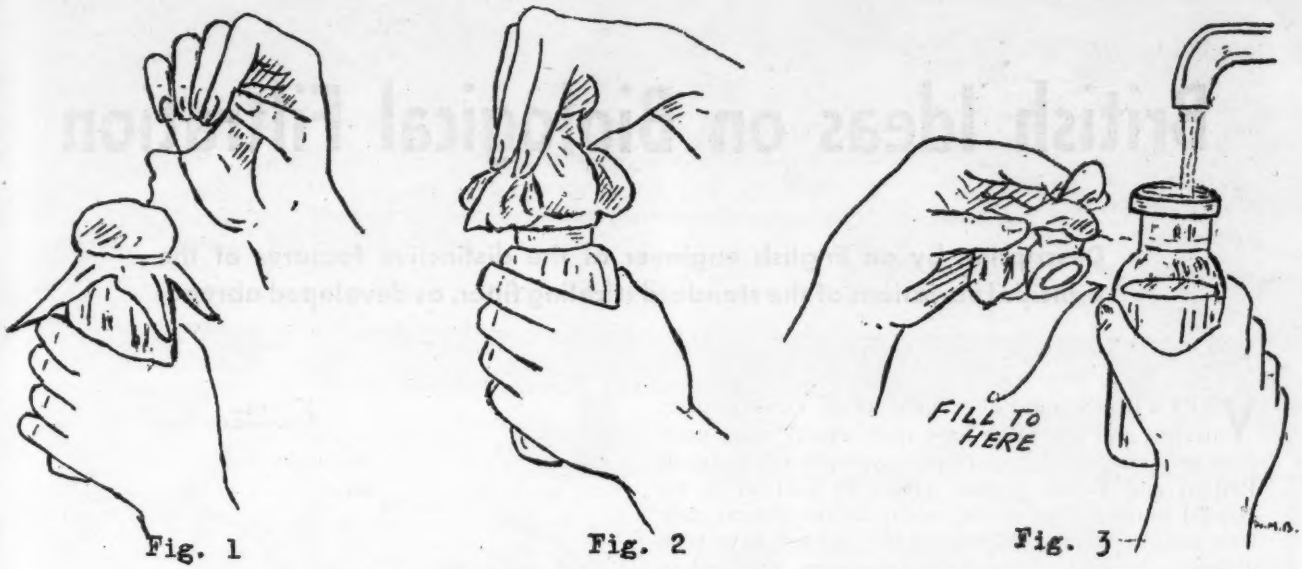


Fig. 1 Fig. 2 Fig. 3

Illustrating correct way of collecting a sample of water from a faucet.

Collecting Water Samples for Bacteriological Analysis

Clear and detailed explanation of method recommended by the State Department of Health of North Dakota for collecting a sample from a faucet.

THE following suggestions of the State Department of Health of North Dakota, published in the Bulletin of the Dakota Water and Sewage Works Conference, describe very clearly and in detail how to collect a sample of water for a bacteriological analysis.

If possible, collect all samples from a tap or faucet.

Before turning on the water, or pumping the well, the faucet should be flamed in order to insure the destruction of any bacteria which may be clinging to the faucet. If available, a blow-torch can be used for this purpose, otherwise it may be necessary to wad or roll up paper toweling or a newspaper. The flame should be directed against the inside edge of the faucet as much as possible.

Next, turn on the faucet and let the water run a few seconds. In the case of a hand-pumped well, water should be pumped for a half-minute or so before the sample is taken.

Next, take the sample bottle from the double container and remove the outside cord as shown in Figure 1. The corners of the cloth covering should then be carefully folded up and held against the top of the glass stopper, as shown in Figure 2. Do not remove the cloth covering from the stopper.

Hold the bottle in one hand and, with the other, remove the stopper and cloth covering together, as shown in Figure 3. Care should be exercised in removing the stopper, as it is fastened to the neck of the bottle by means of a short cord. This cord should not be untied from the bottle or stopper. In removing the stopper, hold it in such a position that the cloth covering will shield the stopper from falling dust particles. Next, hold the bottle under the faucet, as shown in Figure 3, allowing only a small but steady stream to flow from the faucet when filling. Do not splash on the lip of the bottle any more than necessary. Immediately remove the bottle from underneath the faucet and replace the stopper. Press the cloth down around the neck of the bottle and tie it into position with the cord.

In removing the stopper and replacing it in the bottle, do not touch either the stopper or the lip of the bottle with the cord or cloth covering. There may be some dust-carried contamination on the cloth which could be carried to the bottle in this way and washed into the bottle when collecting the sample.

Be sure and fill out the instruction sheet accompanying the sample bottle completely.

Commenting upon the first paragraph of this, H. B. Foote, Director, Div. of San. Engineering, Montana State Board of Health, says: "We, too, believe that the flaming of sampling faucets is important. We always carry with us in our field work a small bottle, probably of 4 oz. capacity, in which is some alcohol of sufficient strength to burn readily. We make a torch by inserting through the cork of the bottle a small diameter wire. This is fastened securely into the cork. On the other end of the wire, which is just long enough to reach the bottom of the bottle, we fasten, by twisting the wire, some waste or other absorbent material. In using this, we simply lift out the cork, pulling out the wire with the wad of absorbent material well saturated with alcohol. This we ignite for use in burning the faucet. The flame is strong enough ordinarily to use even if there is some wind blowing, as it may when flaming a pump spout."

British Ideas on Biological Filtration

Description by an English engineer of the distinctive features of the principal variations of the standard trickling filter, as developed abroad.

VARIATIONS and developments of trickling filter design and operation have, for several years past, been receiving attention of sanitary engineers in Great Britain and British South Africa as well as in the United States. Some of the modifications abroad have been similar to those advocated here, others have been different. Several of the latter have been described in PUBLIC WORKS during the past two or three years (January, 1945; March, 1944; etc. Also items in the "Sewerage Digest"). In the April 13th issue of *The Surveyor* John Hurley, a well-known English sanitary engineer, briefly summarized the principal variations of the percolating filters and noted the distinctive features of each. His excellent article, slightly condensed, is given below.

Investigations of the last decade have shown that the possibilities of the percolating filter were much wider than had been realized. In particular, they have demonstrated that by the selection of suitable modifications of design and operation, biological filtration can be adapted to suit a very wide range of conditions.

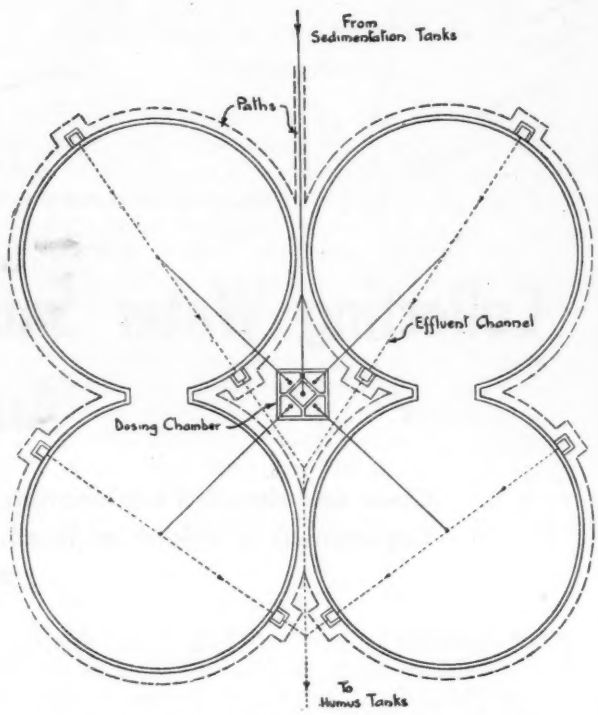
It is impossible to compile a list of these processes in an order of merit, for they have not been tested when all working in parallel and dealing with the same tank effluent. Indeed, it will never be possible to provide any such thought-saving and convenient table, applicable to all sewages and all conditions of site and circumstance. The best that can be done is to indicate the chief characteristics of each process, leaving the designer to select the type of technique most suitable for the conditions under which the particular plant has to operate.

Processes Available

Besides the conventional percolating filter, working as a single-stage plant at a moderate rate of dosage, the following are the chief modifications which call for consideration:

1. *High-rate Single Filtration.*—It has been found, both in this country and in America, that a reasonable degree of purification can be effected by dosing percolating filters at very high rates, using fairly coarse filter material, say 2 in. to 4 in. grade. The maintenance of effective aeration is essential. Experimental work at Leeds and Huddersfield has indicated that dosages of the order of 1,000 gallons per cu. yd. per day are practicable. Of course, this process yields only partial purification, producing effluents of roughly the same quality as those obtainable by chemical precipitation. Thus it offers possibilities of usefulness as a preliminary to further purification, for instance, as a relief to an overloaded plant; or in cases in which high stream dilution makes the production of a first-class effluent unnecessary.

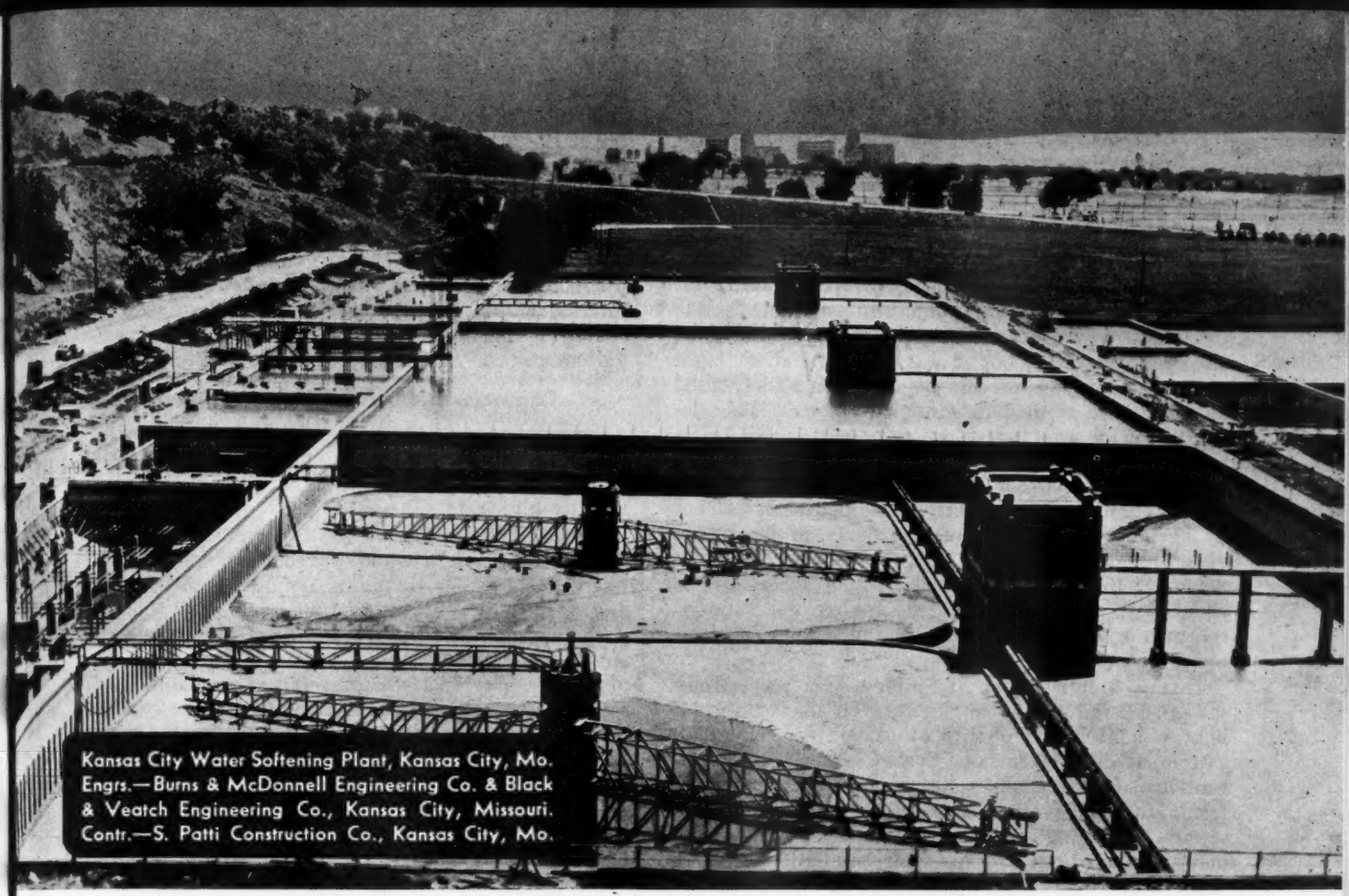
2. *Double Filtration.*—This method of operation is by no means new, but further information has recently



Suggested lay-out of filters for a medium or small plant.

come to light, particularly from Huddersfield. A recent paper on small-scale experimental work carried out at that town on a sewage containing much trade waste, indicated good prospects from dosing the primary filter at five times the rate of the secondary filter. It was calculated that by dosing the primary and secondary filters at 650 and 130 gallons per cu. yd. per day, respectively (giving an overall figure of 108), results could be obtained equivalent to those yielded by conventional single-stage filtration at a rate of 65 gallons per cu. yd. per day.

3. *Alternating Double Filtration.*—In this process, instead of maintaining the same order of filtration (as in the work just described), the order of filtration is periodically interchanged. That is to say, one filter is transferred from primary to secondary duty, while the one-time secondary filter becomes the primary stage. Most of the work on this process has been carried out by the Water Pollution Research Board, much of it in full-scale plants. Working at about double the dosage of conventional filters, it has produced effluents of about the same quality. In a recent paper on the treatment of camp sewage containing laundry wastes, an ordinary percolating filter plant working at 45 gallons per cu. yd. per day was reported to have been converted to an alternating double filtration plant operating at about 70 gallons per cu. yd. per day with



Kansas City Water Softening Plant, Kansas City, Mo.
Engrs.—Burns & McDonnell Engineering Co. & Black & Veatch Engineering Co., Kansas City, Missouri.
Contr.—S. Patti Construction Co., Kansas City, Mo.

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increased efficiency. There has been a trend towards decreasing the period between the change in filter rotation; whereas these "alternations" previously took place at intervals of about twenty-one days, recent practice seems to favor a daily change over.

4. *Recirculation.*—The return of purified effluent to dilute the filter feed had been used in this country for many years for certain specific purposes, such as the treatment of difficult trade wastes or the cleaning of clogged filter beds, but it was not until about eight years ago that the process began to be widely used as a standard method of sewage treatment. This development followed investigations carried out in America, and it is in that country that recirculation has been most widely employed. The two most common methods of operation are the return of unsettled filter effluent to the inlet of the sedimentation tanks, or the return of settled filter effluent direct to the filter feed. In America, the ratio of returned liquor to sewage is about 4:1, and in general the higher the ratio of returned effluent, the better are the results obtained for the same dosage of sewage.

In this country, work at Shipley on a very strong sewage showed that by employing recirculation a great improvement in the quality of effluent was obtained, as compared with the same dosage of sewage on conventional filters. Small-scale work recently reported from Huddersfield has shown that in the case of a sewage containing an abnormal amount of trade waste, they obtained better results by recirculation than by conventional filters, but not so good as by double filtration. It should be noted, however, that in these experiments the ratio of returned liquor to sewage was only 1:1. Judging from experience elsewhere, a higher ratio of returned liquor would have yielded better results; it may be added that recent reports from Germany confirm the advantages of increasing dilution.

5. *The Cyclo-nitrifying Filter.*—This process was evolved a year or two ago at Sheffield, to relieve an overloaded bio-aeration plant. By feeding bio-aeration plant effluent through a high-rate percolating filter, and returning nitrified filter effluent to the bio-aeration plant, a noticeable improvement was obtained, both in the quality of the final effluent and in the condition of the sludge in the bio-aeration plant. The effluent from the nitrifying filter has also been found to be effective for cleaning clogged filters. For purposes of classification, the cyclo-nitrifying filter might be conveniently grouped with the recirculation processes.

6. *Enclosed Aerated Filters.*—In this type of filter the walls and roof completely enclose the filter bed and distributor, and a current of air is continuously passed downwards through the bed by means of a fan situated in the apex of the roof. The process originated in Germany, but has been thoroughly explored on the works scale both in South Africa and in Britain. These investigations have shown that the filter can take from two to three times the dosage of an open filter, with the production of an effluent of similar quality.

The high rate of dosage, coupled with the fact that enclosed filters are usually constructed much deeper than open ones, makes this type of plant very economical as to the site area required. It also offers a good measure of control of smell and fly nuisance; in addition, owing to heat conservation and the protection from the weather, it is less liable than the open filter to freezing and other winter troubles. The filter is usually about 13 ft. deep, and investigations have indicated that most of the purification takes place in the top 9 ft. or 10 ft. This has been suggested as an explanation of the fact that an enclosed filter 18 ft. deep at Glasgow, did not put up such a good performance as those elsewhere. The Glasgow filter also experienced more trouble from surface fungus. Besides being used for full treatment, it appears that this process has distinct possibilities for partial treatment. An enclosed filter 6 ft. deep at Wolverhampton gave very encouraging results at dosages of the order of 1,000 gallons per cu. yd. per day.

Characteristics of the Newer Methods

From this point of view, there is little which need be said of high-rate single filtration, for it is in essentials an ordinary percolating filter working at an exceptionally high rate.

Double Filtration.—Of the two methods of double filtration ("straight" and alternating) the latter is likely to be rather the more complex, both in design and operation. With alternating double filtration, the periodic changes in the order of filtration undoubtedly entail certain complications, while pumping plant must always be provided, whatever fall is available on the site. On the other hand, interchange of the order of filtration has been found to be of considerable benefit in counteracting "ponding" troubles. With both of these processes of double filtration, the saving in site area is roughly proportional to the increased dosage as compared with ordinary filters, after allowance has been made for any additional humus tanks required.

On the question of costs, from the saving of capital expenditure on filters must be offset any extra capital on pumping plant, humus tanks, control valves, etc., while on the question of maintenance there may be items both for and against. For example, the alternating double filtration system will almost certainly need more attention than an ordinary filter plant from the purely "water control" angle, but there are fewer filters to maintain and in addition money may be saved on such items as the forking of filters.

Recirculation.—Against the advantages offered by this process, of which the dilution effect on rushes of trade waste is not the least, must be set the cost of pumping. If American recommendations are followed, this entails pumping back about four times the volume of the sewage flow. Also, American results indicate that for this process shallow filters (say, 3 ft. deep), are best; if this be accepted, it is doubtful whether any saving in site area could be expected as compared with a conventional installation of percolating filters of about 6 ft. depth. On the other hand, work in this country has shown that recirculation can be a reasonably effective process even when applied to filters of normal depth. Like the double filtration process, recirculation entails plant and attention not required by normal filters, and in the main the same points have to be borne in mind as have been mentioned in connection with double filtration. This also largely applies to the cyclo-nitrifying filter, although the latter is intended as an aid to other processes, rather than a plant in itself.

Enclosed Aerated Filters.—If the usual practice of making the filters deep is followed, the sewage may have to be pumped in some cases where this would not be necessary with the shallower conventional filters; this, of course, depends on the site. There is also a small expenditure on power for driving the aerating unit. Such expenses have to be weighed against any saving on capital cost. An advantage of this process,

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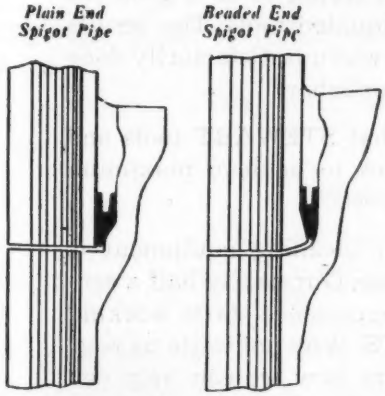

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besides saving in site area, is the small number of distributors which have to be maintained; on the other hand, distributors are not so readily accessible as open filters for rodding of the filter arms.

Possible Combinations

It is obvious that recent developments have opened up many new possibilities in sewage filter technique. These possibilities are not limited to the use of one or other of the newer processes; several possible combinations of these processes, both among themselves and with the activated sludge process or the ordinary percolating filter, are worthy of consideration. For example high rate filtration (in either open or enclosed beds) might be used in conjunction with other processes, as also might recirculation. The cyclo-nitrifying filter was developed to aid a bio-aeration plant, and might be used in much the same way in conjunction with a percolating filter installation, which would give a blend of recirculation with double filtration. South Africa investigations have shown that a modification of the alternating double filtration technique can be advantageously applied to enclosed aerated filters. Such possibilities could be multiplied at length, in a manner reminiscent of the "permutations and combinations" of our school days.

It is noteworthy that some of the newer modifications of filter technique, while retaining the hardiness of the percolating filter, challenge the activated sludge process on what have hitherto been its strong points, notably small site area and freedom from fly and smell nuisance. This is by no means equivalent to saying that the activated sludge process is doomed; the possibility of obtaining cheap power from sludge gas for running this process may do much to offset one of its principal drawbacks—high maintenance costs. Also, most of the newer filtration processes will usually consume power, although not normally on the same scale as the activated sludge process.

It may well be that we shall often find an activated sludge process and a variant of the percolating filter installed on the same works, working either in series or in parallel. Besides the circumstances which have already caused this practice to be used in a few instances, there are other arguments calling for consideration. The percolating filter is usually least efficient in winter, whereas an activated sludge process seems more prone to develop trouble in summer. Where the size of the plant makes it feasible, there is therefore much to be said for having both processes on the same works. Seasonable redistributions of load between the plants are then possible, with consequent advantages in efficiency and economy.

Comparison With Conventional Filters

It is unwise to carry generalization too far, but it appears safe to say that schemes incorporating the newer developments would usually be rather more complex in design, and possibly need more skilled maintenance, than conventional filter plants. As already mentioned, the newer processes would also often consume more power than ordinary filters. On the other hand, in some directions the maintenance work under the newer systems might be less, owing to there being fewer distributors and less filter area (and volume) to maintain.

The general position is that recent research has disclosed several methods of increasing the efficiency of the percolating filter, and of enlarging its sphere of usefulness. As most of these methods have been tried and proved on a practical scale, they cannot be ignored

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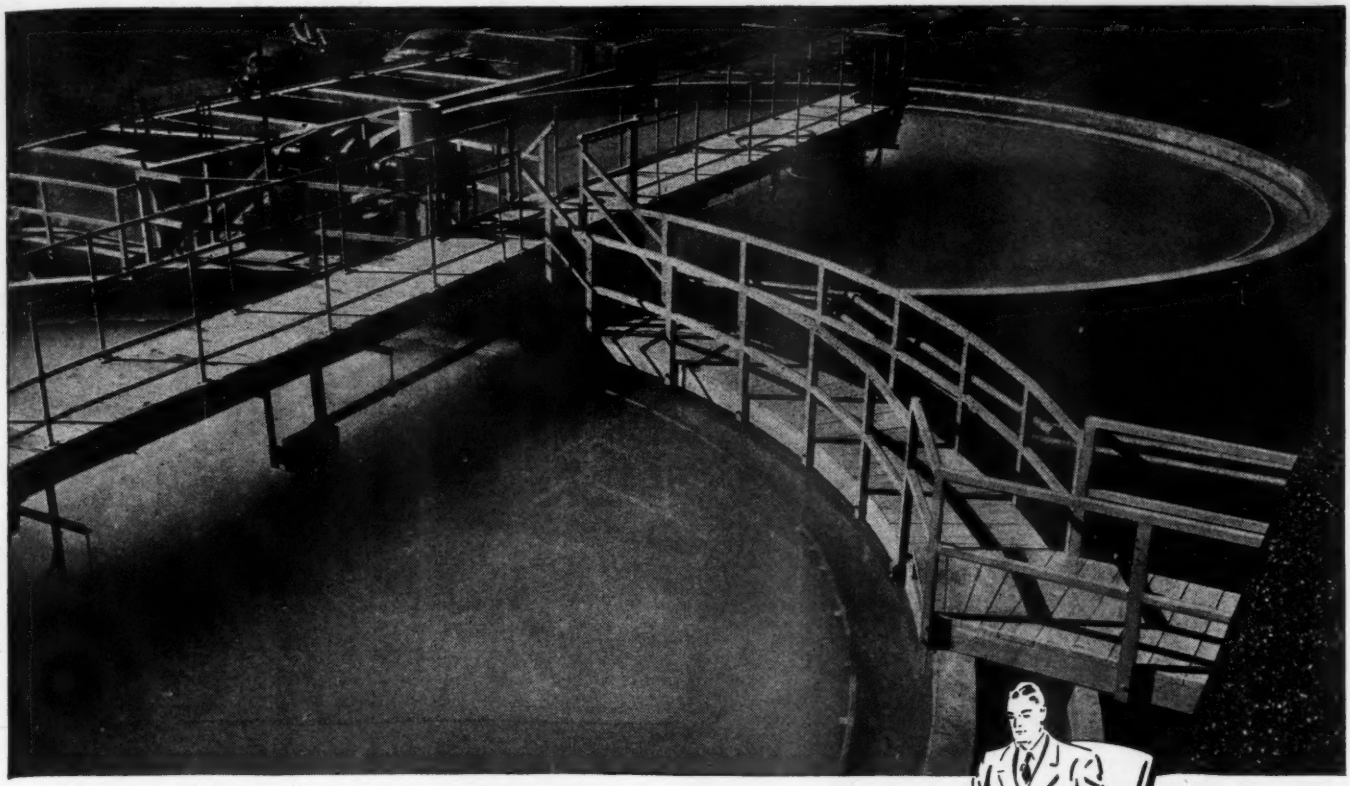

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2—Even graduations make it easy to read low as well as high flows from a distance.

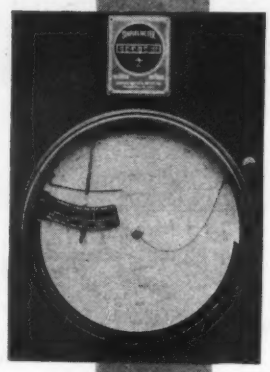
3—Greater accuracy of chart readings from planimeter.

4—Extreme accuracy of chart record is inevitable since pen arm connects directly with bell-shaped float.

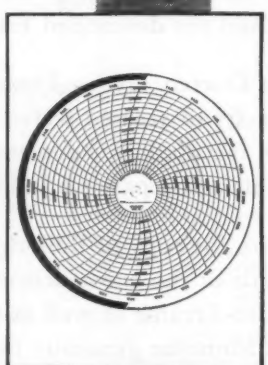
5—Special moisture proof paper eliminates stretching and shrinkage—chart cannot slip in use.

Simplex has "engineered" the chart on the MS meter as well as every mechanical detail. This direct reading chart is made possible because of the unique bell-shaped float which extracts the square root of the law of flow. Here is accuracy, ease of recording, and ease of reading—yours for the using in every Simplex Type MS meter. There is no finer meter at the price. Specify Simplex MS meters. Write for details today.

SIMPLEX VALVE & METER CO.
6750 UPLAND STREET, PHILA., PA.

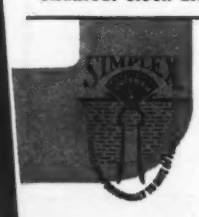


MS meters can be set up as indicator; recorder; indicator and recorder; indicator and totalizor; recorder and totalizor; or indicator, recorder, or totalizor.



12" circular chart for daily or weekly removal. Electric or mechanical clock drive.

SIMPLEX METERS
THE METER WITH THE BELL SHAPED FLOAT



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by the sewage works designer. Of course, the mere fact that a particular process can get more work out of a cubic foot of filter medium is not in itself sufficient to justify its selection. Installation and maintenance costs have to be carefully assessed, together with such items as the ability of the process to cope with the variations in strength of sewage and rate of flow prevailing at the works in question.

If engineers show the requisite blend of initiative and caution, it would seem that in post-war sewage disposal schemes the newer methods should be "given a show" on some of the larger and medium sized works, but the conventional filter is likely to remain first favorite for small plants. It should be added that recent work on distribution, and some which is now in progress on methods for improving aeration and the time of contact, may bring about an increase in filter efficiency, yielding better purification or permitting higher rates of dosage without drastic alterations from the conventional method of operation.

Convenience of Operation

Athough engineers and scientists devote much attention—though sometimes not enough—to certain essential features of filter design and operation, convenience of operation and maintenance often receives insufficient consideration. It must always be remembered that easy maintenance may make a great difference in the results obtained. For example, it is no use installing a theoretically perfect system of distribution, if during the greater part of the day most of the distributor orifices are choked and inoperative. Keeping the distributor nozzles clean is still one of the chief maintenance jobs on a filtration plant, and certainly one of the most important. It is therefore desirable to design the plant in such a way that the nozzles do not clog easily, and if they do clog, cleansing of the filter arms should be as simple as possible.

Minimization of jet maintenance begins earlier in the plant, where good sedimentation, effective scum boards and possibly screens in the filter feed channels can be very helpful. However, with many sewages, even attention to these points still leaves jet blockage a considerable problem. The provision of large jets fitted with spreaders has been advocated as a solution, but it is usually by no means a complete answer.

Where circular filters are employed, commonly in medium and small works, the lay-out shown in the diagram will be found convenient. The design of the filters in batches of four, with the four filters symmetrically placed relative to a central dosing chamber, cuts out the irregularities of dosing which may occur when feed pipes of varying lengths are employed. Long lengths of exposed feed pipes may also be troublesome in very cold weather. It will be noticed that each filter has its individual dosing syphon. This is helpful, as syphon trouble only necessitates the stoppage of a single filter. Also, the direct connection of each filter to a syphon seems to be useful in keeping the filter jets clean. The rush of air and liquid through the orifices each time a filter comes into action appears to be of definite assistance in this connection. Another point is the joining of the filters in pairs; the "common space" between the beds provides a convenient place for rodding the filters, in which the maintenance man can do his work—cleaning two filters from the same spot—without acrobatics. It will also have been noticed that the clogging of jets in circular filters is usually more prevalent in jets near to the periphery; the rodding place also gives the man a chance to clear these individual jets without walking on the bed.

Financing Water Main Extensions in Belmont, Mass.

Belmont, Mass., has increased in population from 16,400 in 1926 to 28,600 in 1944; and the mileage of water mains increased during the same period from 47.9 to 76.2. Until 1927 the town extended its mains under the guaranty form of arrangement, the real estate developer being required to guarantee a gross income from the extension of not less than 6% of its cost per annum. From 1909 to 1926 it had spent approximately 21% of the water revenue for construction, and had a bonded debt of 40% of the valuation of the plant, and an increase in rates seemed necessary. To avoid this, the water commissioners on Dec. 31, 1926, adopted new regulations whereby applicants for extensions in existing streets must guarantee annual payments for water of at least 10% of the cost of the extension (not including hydrants) for a period of 10 years. Promoters of new subdivisions must pay the town ¾ the cost of laying 6" pipe in all the new streets to the limits of the development. In 1939 this ¾ payment was made applicable to extensions in existing streets, eliminating the guaranty, and changed the basic size of pipe from 6" to 8". This payment must be made in advance and is a form of advance assessment, which the developer can apportion among the lots and recover when he sells them. The shifting of this burden to the developer not only saves the municipality from incurring a large bonded debt and paying interest thereon, but also stimulates the more rapid expansion of the real estate development with the resulting increase in water revenue.

As a result of this change in practice, comparing the 18-year period since the change with 18 years previous, while formerly 73.1% of the cost of constructing mains was obtained by issuing bonds, during the 1927-'44 period this was only 58.8%; the amount taken from water revenues was reduced from 23.9% to 20.1%; and the receipts from developers and other applicants for extensions increased from 3.0% to 21.1%. During the earlier 18 years, bond retirement totaled $57,000, and during the latter period was $362,500. The total bonded indebtedness in 1926, less sinking fund, was $170,673, which was reduced to $62,000 by 1945.

The above is a brief abstract of a talk by Walter C. Conroy, General Superintendent of the Belmont Water Dept., at a Round Table Session of the New England Water Works Ass'n last February.

Compensation on Condemnation of Undeveloped Streets

In Maryland the owners of property abutting on a city street own the fee in the bed of the street, but this is merely a naked fee, because it is subject to the public easement to use the street. The owners are entitled only to nominal damages for the condemnation of their naked fee. In condemnation proceedings by the Government to acquire certain large parcels of land for the construction of facilities to be used for a shipyard, instituted under the Second War Power Act of 1942, it was held that where streets and alleys in a city existed only on paper, although the city had some sewer and water lines under some of the so-called streets, and all the property had been condemned by the federal government, the city was entitled to no more than nominal damages for its easement in the condemned alleys. United States v. Certain Parcels of Land in Fairfield, Federal District Court for Maryland, 54 F. Supp. 667.

how to give water a BATH!

Even sparkling, clean-looking water needs a thorough "going over"... for like a germ-infested jungle stream, it can be the carrier of deadly water-borne germs.... It can tumble forth the dangerous wastes and impurities of industrial plants.

To make water **safe,** both on home and battle fronts, engineers rely on versatile Solvay Liquid Chlorine. This liquid effectively gives water a **bath**—"washing" out impurities, foul tastes and odors.

Today Solvay Liquid Chlorine is serving on two fronts. Tomorrow it will serve municipalities and industry with newly discovered uses.

SOLVAY SALES CORPORATION
Alkalies and Chemical Products Manufactured by The Solvay Process Company
40 Rector Street **New York 6, N. Y.**

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How Oneonta Accomplished Much From Little

Replaced wooden bridges and culverts with concrete, repaired and widened old asphalt pavements, and opened streets for new developments, all in a most economical manner.

By W. J. NASH, JR.
City Engineer, Oneonta, Alabama

ONEONTA, ALA., county seat of Blount County, has a population of some 3,000. It has no industries beyond saw mill, ice plant, etc., does not own any of its public utilities, the tax rate is only 5 mills and the license schedule is low compared with other cities of like size. This limited income and a heavy debt load inherited from the early 30's forces the city to economize in the maintenance and enlargement of its services.

At the beginning of 1944 a study was made to determine what projects that would be financially possible would be of most benefit to the most people, and the following were decided upon: 1—Replace all wooden bridges and culverts with concrete ones. 2—Repair all old asphalt streets. 3—Open badly needed new streets. These I shall discuss separately although they were handled jointly and completed almost simultaneously.

Bridges and Culverts

The annual cost of upkeep of the city's wooden bridges was above $2,500 and they were a constant hazard from animals and vehicles breaking through them; in fact, such accidents had cost the city considerable amounts as damages.

For culverts, where 60″ pipe or smaller would give sufficient capacity, this was estimated to be the cheapest solution. Clay pipe, furnished by W. S. Dickey Clay Mfg. Co., was used for all sizes up to 15″, and reinforced concrete pipe, furnished by the Fayette Concrete Pipe Co., for 15″ to 60″ sizes. It was believed that clay pipe could be used safely if covered with 18″ or more of soil, and concrete pipe with 8″ to 15″ cushion, except on a street used by extremely heavy loads.

It would have been very difficult to obtain the amount of reinforcing steel required for building our new bridges with flat concrete slab tops, and the arched type was adopted as giving maximum strength with a minimum amount of steel; also the cost of construction is less, a larger flow of water is carried per cubic yard of concrete, and the appearance is more attractive.

All our wooden structures have been replaced at a cost of some $12,500, and this has effected a permanent saving of $2,500 annually in maintenance; in addition to the elimination of hazards to life and property.

MAKE REPAIRS PERMANENT WITH AN
84-HD ASPHALT KETTLE
An 84-HD with Motor Spray Attachment repairing a city street.
Highway, Roads and Streets maintenance work is easy with an 84-HD Kettle. It heats faster and gives a continuous flow of materials because it's designed that way. Two patented features Screened Reservoir and Double Heat Circulation System are found only in this Littleford Kettle. Make repair jobs easier by having an 84-HD to do the job.
BLACK TOP ROAD MAINTENANCE EQUIPMENT
LB
SINCE - 1900
LITTLEFORD
LITTLEFORD BROS., INC.
452 E. Pearl St., Cincinnati, 2, Ohio

When you need special information—consult the classified READER'S SERVICE DEPT., *pages 73-75*

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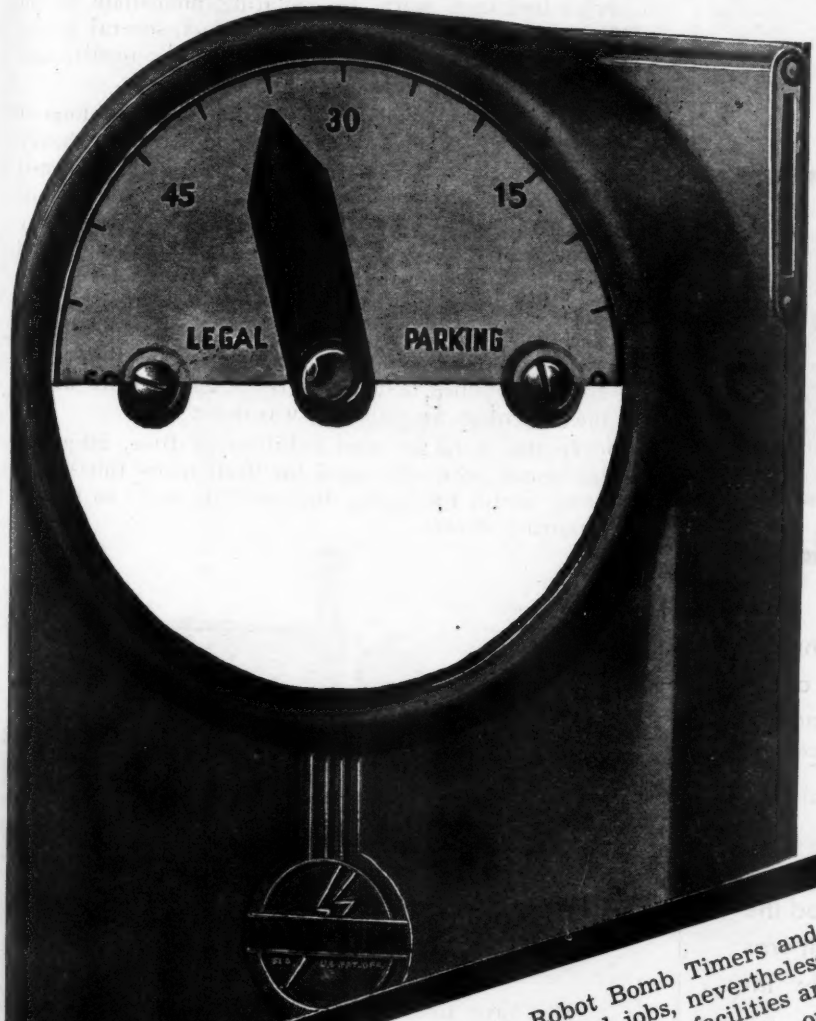


MANUFACTURING PRIORITY GRANTED

MARK-TIME

—the Parking Meter that HELD UP during the War without peacetime servicing . . .

LOW UPKEEP COST

Again the amazingly low maintenance costs of Mark-Time Meters has been irrefutably demonstrated. Manpower for the usual, peacetime servicing simply has not been available. Just check with any city using Mark-Time, and you will hear lavish praise of this meter's sturdiness.

MARK-TIME READY TO MANUFACTURE

Mark-Time's plant is today substantially enlarged, improved and operating at peak efficiency. Though we shall allow nothing to stand in the way of our production of Norden Bomb Sight parts, Robot Bomb Timers and other critical jobs, nevertheless our manufacturing facilities are great enough to permit our swinging immediately into production of parking meters. We do not have to rely on outside production. The parking meter is built completely in our own factory.

MARK-TIME IS NOT AN ASSEMBLED METER

We are not hampered by outsiders' commitments. Having taken care of our own obligations to our nation, we are in position to arrange our own schedule of parking meter production.

MARK-TIME READY TO TAKE ORDERS

We are in position to make delivery promises you can depend upon. This is your opportunity to secure rugged meters that stand the gaff. Mark-Time also brings you low operating costs . . . no meter winding expense—these meters are self-winding. They are also simpler, and more convenient, for your traffic officers. The big, Mark-Time dial spots violations at a glance, gives you positive proof, and squelches arguments. Make certain your city enjoys Mark-Time advantages. Our production during wartime is limited. Write us today.

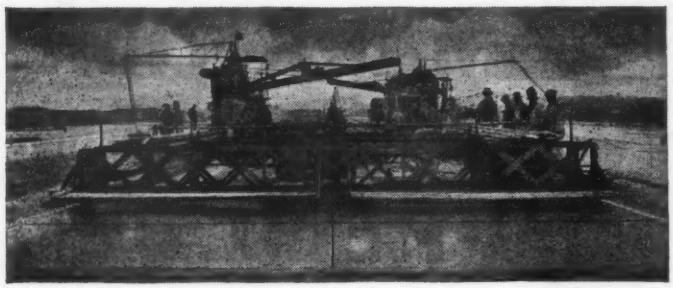
MARK-TIME

MARK-TIME

M. H. RHODES, INC.

30 Bartholomew Ave., Hartford 6, Conn.

The Value of Good Roads!



Take a look at the highways of Pennsylvania, Iowa, Texas, and all the other States where practically all contraction joints were installed by 'FLEX-PLANE' machines many years ago, under varying climatic conditions.

Why have these roads and joints stood the test of years? First: A good type Joint was used. Second: They were 'uniformly' installed by 'FLEX-PLANE' machines.

When ⅛" thick material is used for dummy joints, the joint material should not be *too soft* or *too hard* but just right to allow compression, when the *upper part* of the slab is under intense heat.

'FLEX-PLANE' installed joints *insure* good value in concrete roads.

FLEXIBLE ROAD JOINT MACHINE CO.

WARREN, OHIO

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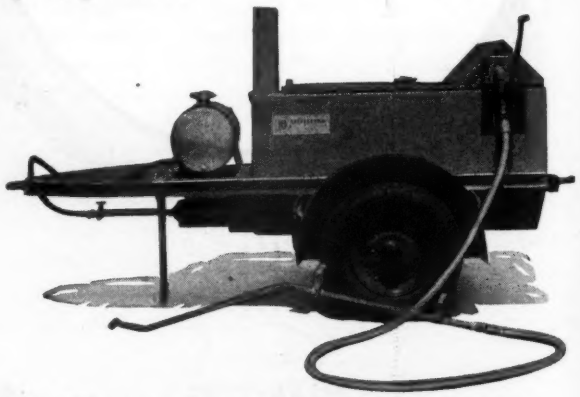
Repairing Old Asphalt Streets

One of the largest items of expenditure was for repairing asphalt streets. These had been laid in 1928, on the existing chert surfaces with little foundation preparation; and as the surfacing was made only 16 to 18 ft. wide, with no curb, gutter or other protection for the edges, these were flaking off badly and many holes had been worn, necessitating immediate action to save what surface remained. In fact, several blocks had to be torn up and cherted because the repairs had been delayed too long.

In repairing these streets, we used crushed stone of irregular sizes carefully screened and Tarvia A, heavy grade. The holes were cleaned carefully, and roughened if smooth. Then hot Tarvia was poured into the hole (we found liberal use of tar at this point to be very economical) and the crushed stone placed in it and tamped lightly until the new material was level with the existing surface. Then a small additional amount was placed on top and traffic permitted immediately, which worked the top stone in and the binding agent up. We obtained best results if the temperature was in the 80's when the patching was done.

In this work we used a Littleford Bros. 50-gallon tar heater, which has paid for itself many times over, being useful for laying and patching roofs as well as repairing streets.



"We used a 50-gallon Littleford Bros. tar heater."

We have found that considerable damage to the asphalt surfaces is due to improper drainage, and all of these streets were checked and where necessary we used our grader to ditch the streets, dirt from the ditches being brought to the edge of the pavement, filling to the level of the pavement and thus reducing future flaking off of the edges. We have concluded from close observation of this pavement repairing that it is the most economical and durable that we have ever done, and we expect to continue use of it.

Opening New Streets

The rapid growth that was being experienced by the city necessitated opening more streets. The city was financially unable to open all the dedicated streets within the corporate limits, and selected those to be opened during the coming year by considering: a—Number of people served; 2—aid to the general drainage problem; c—removal of swampy condition as aid to mosquito control; d—improving the appearance of the city as a whole.

We were faced with shortage of both manpower and equipment, as the street crew was overloaded with maintenance and refuse collection and we were unable to hire additional labor or equipment. To solve this problem, all the solid refuse collected which would not

TEN REQUIREMENTS
FOR UNDERGROUND MAINS
under normal conditions

Long Life: In evaluating bids, the useful life of cast iron pipe is figured at 100 years minimum.

Carrying Capacity: The carrying capacity of standard tar-coated cast iron pipe remains practically unimpaired for centuries. For the certain areas where tuberculating water is encountered, cement-lined cast iron pipe is available. Under such conditions, no other material offers the combined long life and sustained carrying capacity of cement-lined cast iron pipe.

Tight Joints: For *ordinary* pressures, cast iron bell-and-spigot pipe—for *high* pressures, cast iron mechanical joint pipe—are known to be leak-proof.

Tensile Strength: When tested under hydrostatic pressure to destruction, the ultimate tensile strength of cast iron pipe is a minimum of 11,000 p.s.i. for pit cast pipe and a minimum of 18,000 p.s.i. for cast iron pipe made by other methods.

Beam Strength: Under beam stress tests, 10 ft. span, standard 6" cast iron pipe sustains a load of 15,000 pounds and bends approximately one inch before breaking.

Toughness: Under hydrostatic pressure and the impact of a 50 lb. hammer, standard 6" cast iron pipe does not crack until the hammer is dropped four feet.

Internal Pressure: An average of many internal hydrostatic pressure tests on standard 6" cast iron pipe shows this pipe withstands more than 2500 pounds pressure per square inch.

External Load: In regulation ring compression tests, standard 6" cast iron pipe withstands a crushing weight of more than 14,000 lbs. per foot.

Imperviousness: The walls of cast iron pipe are impervious to leakage, seepage, or sweating of water, gas or chemicals under internal pressure tests.

Tapping: Cast iron pipe can be tapped cleanly with strong, tough threads, losing little in structural strength.

Other pipe materials meet some of these requirements but only cast iron pipe meets them all.

Whether a pipe material is able to fulfill these requirements is a matter of experience rather than prediction. A page of history is worth a volume of sales claims. History proves that cast iron pipe has been meeting these ten requirements for generations.

Cast Iron Pipe Research Association, Thomas F. Wolfe, Research Engineer, Peoples Gas Building, Chicago 3.

CAST IRON PIPE
SERVES FOR CENTURIES

When you need special information—consult the classified READER'S SERVICE DEPT., *pages 73-75*

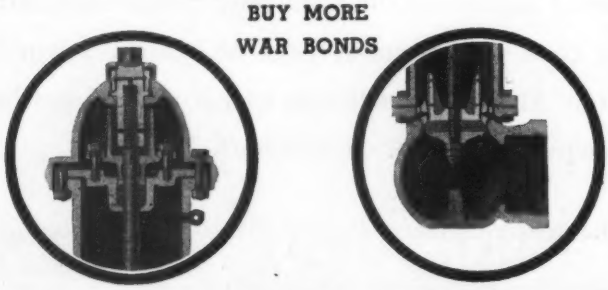
Good Insurance For Your City

The strictest kind of fire regulations and safety laws will not prevent all fires. There still will be spontaneous combustion, explosions, lightning, and other unpredictable causes to start fires. Since "an ounce of prevention is worth a pound of cure", the best kind of fire insurance for your city is MUELLER-COLUMBIAN Improved Fire Hydrants. When a fire does break out a quick response by your firemen is important. If time is lost trying to untangle snarled cap chains or yank open a cranky hydrant, a terrible conflagration can develop from what should have been a minor blaze.

Your firemen can expect quick action from a MUELLER-COLUMBIAN Improved hydrant. Precise clearances on the cap chain loops permit quick removal of the caps without tangling. The exclusive self-oiling feature in the bonnet lubricates all parts, and prevents binding, rust, or corrosion. You can open this hydrant instantly—anytime. The specially designed compression-type main valve, large shoe, and over-size barrel provide a full, free waterway. You get plenty of water in a hurry.

These features make good fire insurance for your community since precious minutes need never be lost at a MUELLER-COLUMBIAN. Get the jump on higher fire losses. Provide quick-acting MUELLER-COLUMBIAN Improved Fire Hydrants. Write for our folder giving a quick summary of all the features.

BUY MORE
WAR BONDS



MUELLER CO.
CHATTANOOGA 1, TENN.
DECATUR, ILL. LOS ANGELES, CALIF.

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An International truck with dump body was used as an all-purpose truck.

be a health menace or create an odor nuisance was used as bottom fill-in on the streets to be opened, covering this with soil that was removed in cleaning the ditches of the existing streets. This soil contained considerable grass, which immediately grew when placed on the fills and eliminated the necessity of sodding the banks.

These fills were leveled off at intervals with the grader and traffic allowed to use them at once, which made the use of a roller unnecessary. When a street was up to grade and sufficiently packed, our RD-4 Caterpillar tractor and 10-ft. Caterpillar grader were used to cut them to the desired grade and cross-section. Then chert was placed on the street, using an International truck with a dump body (which we find to be most suitable as an all-purpose truck for both street and refuse collection work). This chert was spread by the grader to a depth of 4″ to 6″ mixed with a small amount of clay. We find such a surface to be smooth and durable and most satisfactory.

By this procedure we have opened the most-needed streets and corrected some of our worst drainage and mosquito breeding problems, all without interrupting the regular schedule of the street or sanitary departments, or hiring additional men or purchasing new equipment. When the project had been completed it was found that its total cost was far less than that of any comparable streets previously opened.

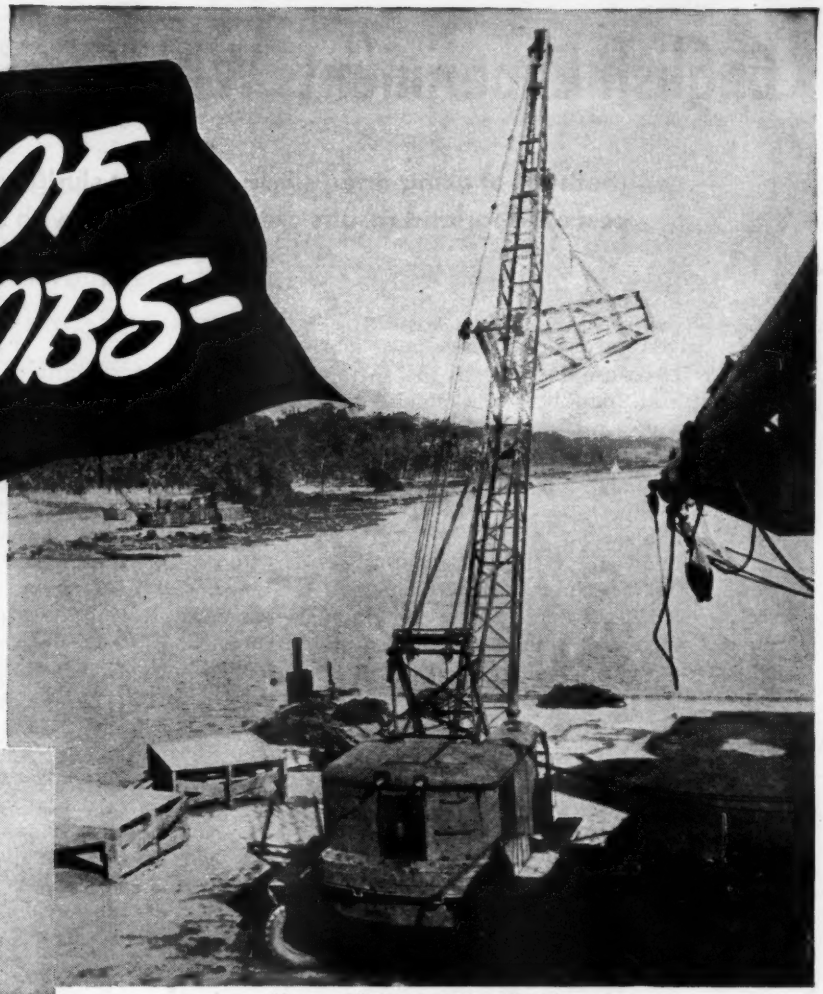
These projects have demonstrated the desirability of adopting a proper schedule of work for using the available manpower; of purchasing equipment which, so far as possible, will be multiple in use; of cost accounting on all maintenance and construction to ascertain the most satisfactory type and make of equipment and material; and rigid checks on results obtained, which will save money, time and criticism.

Condemnation Damages Assessment for Sewage Plant

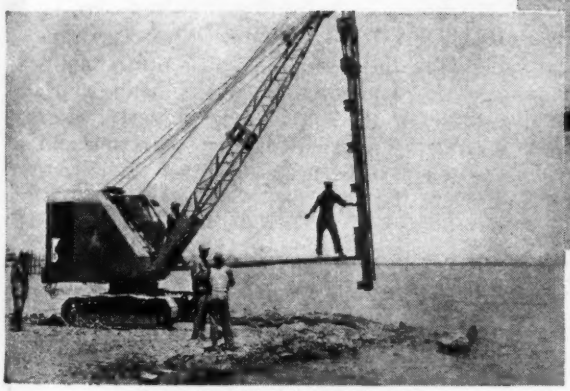
In a proceeding by a town for condemnation of land for a sewage disposal plant it appeared that the defendants' predecessor in interest had conveyed .57 of an acre to the town as a site for a sewage tank, and that the town now intended to abandon the sewage tank and erect a much larger plant on the land now sought to be condemned. The Tennessee Supreme Court held (Board of Mayors and Aldermen, Town of Milan v. Thomas, 178 S. W. 2d 772) that the trial court properly refused to charge that the defendants were not entitled to recover for incidental damages solely because of the use to which the town intended to put the condemned land, if the jury found that it adjoined the tract conveyed by the defendants' predecessor in title.

JACK OF ALL JOBS—

in heavy materials handling



Above—Vital supplies and equipment being unloaded by a "Fighting Osgood Mobilcrane" in the South Pacific.



Osgood "20" driving piles for a landing pier in North Africa.

Helping to clear the way to Berlin and Victory, "Fighting Osgoods" serve under fire with Army Engineers in Europe, as well as on other battle fronts.

"FIGHTING OSGOODS" LIFT, DIG AND DRIVE IN THE BATTLE OF SUPPLY

When the engineer troops and SeaBees "go in" on the heels of our attacking forces, they need the right equipment to do a multitude of jobs quickly and efficiently. Roads and air fields must be leveled, loading docks built, supplies loaded and unloaded, rubble cleared away fast.

Osgood shovels and cranes figure dependably in all these operations . . . working as crane, pile driver and shovel. They're engineered with the power, stamina and versatility to keep precision planning and production on schedule. You'll appreciate these advantages when *your* planning goes into action after Victory.

WHEN IT'S WAR BONDS, BUY MORE THAN BEFORE!

THE GENERAL EXCAVATOR COMPANY
CRANES, DRAGLINES AND SHOVELS
DIESEL, GAS, ELECTRIC

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When you need special information—consult the classified READER'S SERVICE DEPT., *pages 73-75*

English Experiments With Straw-Sludge Fertilizer

Methods of using dried sludge and wet sludge employed at Hampshire, cost of labor and results obtained. Mixed with straw it gives a fertilizer readily disposed of.

ENGLISH farmers produce much more straw than they have use for and in the spring of 1943 the Agricultural Improvement Council suggested making a compost of straw and sewage sludge, thus utilizing the surplus straw and obtaining a fertilizer of better quality than the sludge alone. A number of experimental heaps were laid down in Hampshire, using different methods. These and the results were described in a paper by F. H. Ransome before the Institute of Sewage Purification, which is in part as follows:

The experience gained from the erection of a large number of heaps using straw with different methods of construction and different types of sewage sludge, has brought us to the following conclusions:

(1) Complete soaking of the straw is essential, (2) an adequate amount of nitrogenous material must be mixed with it, (3) aeration of the heaps is essential. In brief, as with other composting, the three essentials are water, nitrogen and air.

The trials in Hampshire brought us to the conclusion that the following two methods provided the best results:

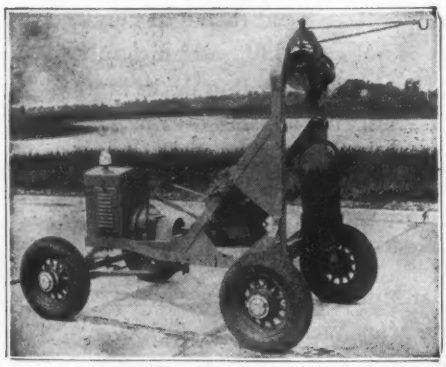
Method I. Using Dried Sludge

Width of heap, 9 ft. Length, any length convenient.

Drainpipes are laid on the ground in rows across the site of the heap at intervals of 2 ft. 6 in. A layer of straw not more than 18 in. thick is placed on the pipes; a layer of dried sludge 2 in. thick is spread over the straw, which is then wetted with water or sewage effluent by means of an engine and pump. Follow with another 18 in. of straw, 2 in. of sewage, and so on for about a total of seven layers, each layer being wetted. The heap will then be approximately 6 ft. in height. It should then be soaked evenly until (but not after) the liquor runs out at the base.

In heaps of this type, a temperature of up to 160 deg. F. was developed within five days. In hot weather, drying out takes place and a further soaking can be given as found necessary. The temperature rises rapidly again following the second soaking, and is maintained for a period of about three weeks, after which it gradually drops. If the job is done properly, after three months the straw will be found to be rotten and the dry sludge will have been broken down. It is con-

KEEP THOSE SEWERS OPEN!



Sewers clogged with sand, roots and other debris are a constant danger to public health and safety. New installations rapidly lose their efficiency due to sand seepage.

You positively can keep the sewers of your city open with an OK Champion—the cleaner that does the entire job from street level. Dig-ups practically a thing of the past.

Three Distinctive Models Available. Write Now for Literature.

CHAMPION CORPORATION
4752 SHEFFIELD AVENUE, HAMMOND, INDIANA

HEAVY-DUTY INCINERATION
MORSE BOULGER
DESTRUCTORS
FOR THE
INCINERATION OF MUNICIPAL WASTES
GARBAGE, RUBBISH, SEWAGE SCREENINGS AND SLUDGE
(BULLETIN NO. 110)
FOR COMPLETE INFORMATION CALL OR WRITE
MORSE BOULGER DESTRUCTOR CO.
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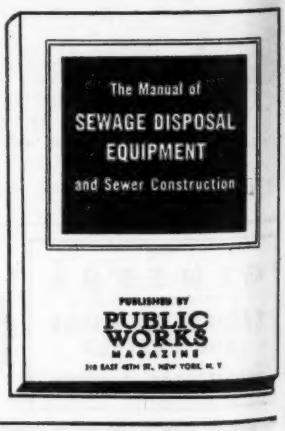

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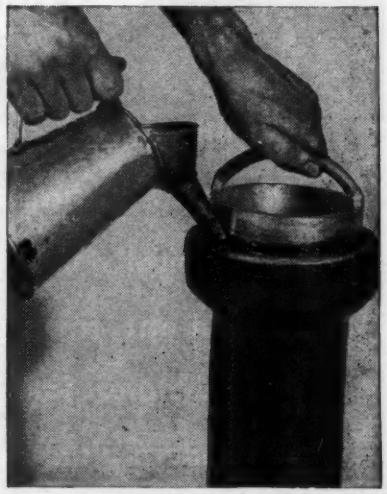

3. For domestic pipe—A simple method is shown using a removable metal form. Bell collar may be poured with either Portland cement or Para-Plastic. When Para-Plastic (which is an adhesive compound holding bond at sub zero weather) is used, it eliminates coating spigot. Pressing of units together gives firm bond.

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sidered probable that the grease content of the sludge is broken down as methane is given off.

Quantities.—4 tons of straw, 8 tons of dried sludge produces approximately 24 tons of fertilizer.

Labor.—The labor cost of making the heap, wheeling dried sludge from the drying beds on to the heap over a 5-yd. roadway was approximately 5s. per ton of finished compost.

Method II. Using Liquid Sludge

Width of heap, 9 ft. Length, any length convenient.

Heaps 9 ft. wide and 24 ft. long were laid down over drainpipes as in Method I.

Each 18 in. of straw was treated with settled primary sedimentation sludge containing about 6 per cent solids. A plank is used on the heaps for the man to walk on, and thus avoid getting the heaps too solid. Bales of straw at the sides of the heap may be used for this purpose. Again the layering is continued until the height of about 6 ft. is reached. After a few days a similar rise in temperature to 160 deg. F. is obtained, and at the end of three months a fairly well-rotted material results, especially at the top and edges of the heaps. The center parts of the heaps have been found to be short of air.

In practice, the amount of liquor applied per ton of straw in this method has been found to be approximately 1,200 gallons. Straw will only absorb about four times its own weight of water, that is, 800 gallons. In consequence, the straw has acted as a filter, but at the same time excessive soaking has occurred, and this accounts for the difficulty of getting air through the middle of the heap. It was found that the turning of such heaps any time after one month from completion resulted in another rapid rise in temperature, and complete rotting took place within two months from turning.

Quantities.—The heaps on a base 9 ft. by 24 ft. took 4 tons of straw and 4,800 gallons of liquid sludge, and produced, after three months, 20-25 tons of fertilizer.

Labor.—It is found in one plant serving a population of 16,000, and designed some years ago to serve 10,000, that directing 50 per cent of the town's sludge on to the straw has relieved the digestion tanks and allowed the process there to be completed in the normal manner. The small amount of labor involved in erecting the heaps and soaking them has, of course, resulted in less dried sludge being produced, and in giving it time to dry out. This naturally results in much easier handling out of the drying beds. In fact, the small staff at these works have found the composting an asset rather than a source of extra work.

Notes

(a) The Heaps.—It is important that the heaps should be built rapidly, not more than three or four days elapsing from the beginning to the end of the process. If a layer or two is added, say, once a week, the bacteria causing the rise in temperature do not have a chance to get into full action.

Where convenient, the heaps may be built within a frame made of straw bales. These can be used again for the same purpose, or the wires cut and the partially wet straw used in the construction of future heaps.

(b) Sludge.—The sludge at the bottom of the primary sedimentation tank is passed to the pump house. It is then pumped through a 6-in. pipe to the digestion tank. This pipe has been tapped and, by means of a length of old fire hose, the liquor has been directed on to the layers of straw. It should be noted that if the elementary rules for the making of the heaps are observed, and sufficient aeration is allowed for, any smell

from the sewage disappears within half an hour of its application to the straw. At no time during the process is there anything to prevent such heaps being made on the edge of inhabited areas.

(c) Straw.—Some councils have found it satisfactory to purchase straw at about 65s. per ton. Each ton of straw makes approximately 5 tons of fertilizer, using the liquid method, giving a net cost of 13s. per ton. Some councils are having straw brought to the sewage works by farmers who, three months later, when bringing further straw, can take back the finished product. It is found that councils generally are not anxious to make a profit provided their net costs and overheads are covered.

(d) The Fertilizer.—The resulting material looks very much like farmyard manure, and its chemical analysis closely approximates to that of a well-rotted sample of farmyard manure, but with a considerably higher nitrogen content and a lower potash content. There is no difficulty in disposing of it to market gardeners; in fact, there is a demand for many thousands of tons which we have not yet been successful in producing.

(e) Haulage.—Although the haulage position is not easy, it has, up to the present, always been found possible to obtain what has been required.

There seems to be no reason why considerable quantities, amounting to tens of thousands of tons, of straw-sludge fertilizer should not be made by councils whose comparative nearness to straw supplies and layout of plant allows, in view of the following facts:

(1) There are many tons of straw surplus to farmers' requirements.

(2) There is an ample supply of sewage sludge not being fully utilized.

(3) Many thousands of acres of land are known to be short of humus.

(4) The methods of composting are clearly established and present no practical difficulties.

Separation of Damages From Water Overflow

In an action by a landowner against a city for damages caused by the overflow of water during rain, alleged to be due to the negligent construction and maintenance of curbs and gutters, there was no separation, in the evidence, of damage caused by natural erosion of the watershed from that charged to the city, although the evidence did not show that the injury claimed was caused solely by the negligent acts of the city, nor did the jury's findings show any such separation. The Texas Court of Civil Appeals held (City of Pampa v. Long, 110 S. W. (2d.) 1001) that the city was entitled to have issues submitted to the jury limiting recovery to its alleged negligent acts and separating the elements of damages.

Pennsylvania Municipalities Must Plan Sewage Works

The Sanitary Water Board of the Pennsylvania State Department of Health has notified more than 200 municipalities to prepare and submit for approval plans for sewage treatment works.

Issuance of these orders is the outcome of ten hearings held by the Sanitary Water Board last summer in various parts of the state. Invitations to attend the meetings were extended to municipalities, industries and other interested parties, who were informed of the Board's intention to undertake a state-wide program of stream pollution control.

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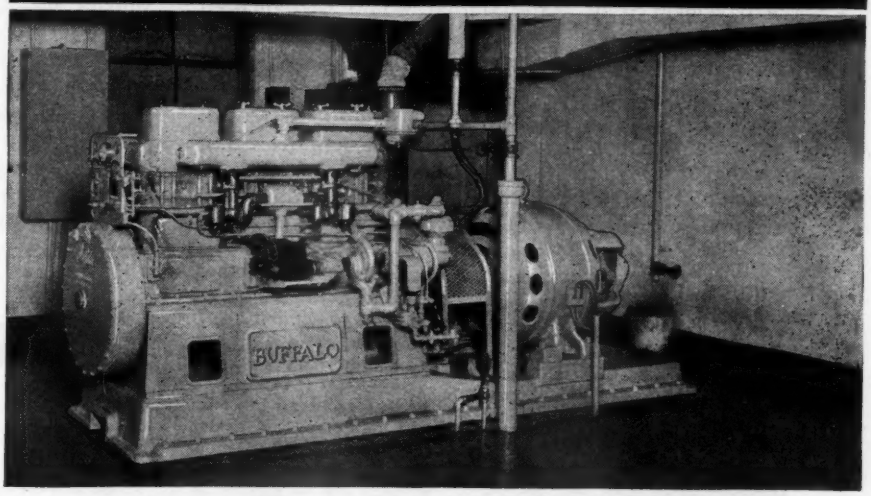

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Constructing Concrete Curbs and Gutters

(Continued from page 16)

With these curbs, a popular cross-section has the shape of a reversed curve extending from the back edge to the gutter line, the face being quite flat, the thickness at the gutter level 8″ to 12″ and the height 4″ to 6″. Such a curb requires no face form and can be built from concrete dropped from the mixer bucket instead of being shoveled into forms. They afford little protection against cars driving over them, but modern cars can mount a 4″ to 6″ curb even if vertical.

In building such a curb, only a back form is needed, which is placed as soon as the pavement concrete has been surfaced. Then fresh concrete is deposited against this back form and the front is formed by means of a special template about 2 ft. wide called a "mule," which strikes it off and trowels it to the desired shape.

Lip curbs are constructed in the same way, being really integral curbs only 2″ to 4″ high.

Combined Curb and Gutter

The general shape and method of construction of combined curb and gutter are the same as of integral curbs. The width of the gutter apron may range from 6″ to 8 or 10 ft. (to provide a parking area where the pavement is of material that would be damaged by oil drippings), but usually is between 12″ and 36″. The slope of the apron should be a continuation of that designed for the pavement adjacent to it. When used with a concrete pavement or base, added strength will be given to both gutter and pavement by tying them together with ½ in. tie bars at about 2½ ft. intervals. If so tied together, expansion joints in the curb and gutter must coincide with those in the pavement. If not tied to the pavement, it is common practice to place construction joints at 6 to 10 ft. intervals and expansion joints at 50 ft. intervals.

Separate Gutters

The most common shape of gutters is a flat V or the arc of a circle, not deep enough to form a traffic hazard. If adjoining a concrete pavement or base, tie bars may be provided to hold gutter and pavement together, in which case joints in the gutter must coincide with those of the pavement. Otherwise expansion joints at about 50 ft. intervals are recommended.

Some Construction Details

Except where separate curbs are built, the grading and rolling should be carried slightly beyond the back of the curb so that the soil under it shall be as well compacted as that under the pavement. In the case of separate curbs, the compacting should be carried slightly beyond the face of the curb; and the excavation for the curb should not be carried further beyond the face than is necessary for setting the face forms, and when these have been removed soil should be tamped thoroughly into the space left by them.

It is desirable to make separate curbs or combined curb and gutter with mixes containing a little less stone than is used for pavements or foundations, so that smooth surfaces can be secured. A 1:2:3 mix, using coarse aggregate with a maximum size of 1 or 1½ in. is common. In some places the stone is omitted and a 1:2½ mortar is used. A plastered curb is inferior to one of one-course construction.

Concrete with a slump of 2 to 3 in. is satisfactory. If the slump is too great, difficulty will be encountered in maintaining a straight curb face as the forms may bulge between clamps; also, curb face forms must be

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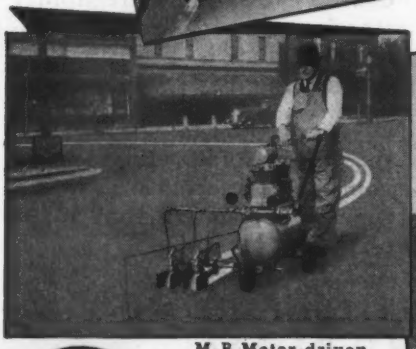
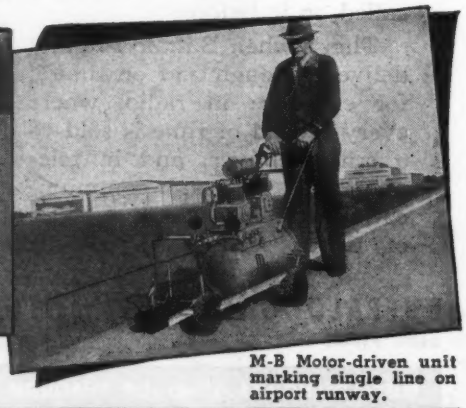


M-B Motor-driven Marker putting down double line at street intersection.



M-B Motor-driven unit marking single line on airport runway.

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left in place longer. If the slump is too little, honeycomb and finishing difficulties may result. The ideal consistency is the least slump with which concrete can be placed with minimum manipulation and yet result in no honeycomb.

Curb or curb and gutter forms are set to a chalk line at the elevation and line of the back of the curb. The back form is set in place and held there by stakes and braces put outside the roadway. In soft soil it may be necessary to set the forms on the tops of stakes driven solidly into the ground. The face form for curb or the apron form for curb and gutter is set from the back form, using a carpenter's level for elevation and a spacer for distance. The apron form is staked and braced like the back form, but the face form for curbs is held in place by clamps tying it to the back form.

In making construction joints, division plates of ⅛ in. steel are used, which also aid in maintaining the correct relative positions of the front and back forms. The plates either fit into keys in wooden forms or are equipped with wings or lugs which fit into holes or slots in the top of either steel or wooden forms. The plates are removed when the concrete is sufficiently hard.

Tamping of the concrete should be uniform throughout the length of the curb. The tendency is to slight it next to the spacer plates, where it is most needed, and under the clamps.

Face forms should be left in place until the concrete has set sufficiently so that they can be removed without injury to the curb. The exposed surfaces are then finished smooth and even by means of a moist wooden float or wet brick, and the edges are rounded with an edging tool.

As soon as possible without marring the surface, the curb and gutter should be covered with wet burlap, cotton mats or other curing materials, which should be kept moist for at least three days. In cold weather the concrete should be protected from freezing during the curing period.

If high-early-strength portland cement is used, the curing time can be reduced and therefore the amount of material necessary for curing and for protection from frost.

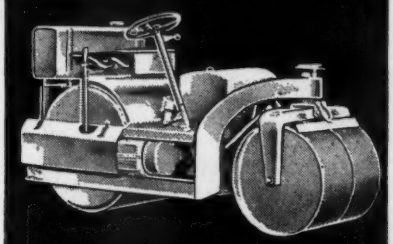
The Portland Cement Ass'n recommends the use of air-entraining cement for the construction of concrete curbs and gutters in areas where severe frost action prevails or where repeated application of sodium chloride, calcium chloride, or granular materials impregnated with these salts is anticipated, either on the gutters or on the adjacent pavements from which solution of these salts will drain or be splashed onto them.

The most common defect in curbs is spalling at joints. Sometimes expansion or contraction joints are covered over when the face is troweled, and then the slightest expansion will cause spalling. This will be avoided if every joint is properly edged. Sometimes a faulty joint or failure to place a joint in integral curb opposite a joint in the pavement will allow expansion to shatter several feet of curb.

Another cause of curb breakage is failure to leave sufficient expansion interval between the back of the curb and any solid structure, especially walks.

California highway department men put the cab heater unit up by the windshield of their snow plow trucks during operations in the deep Sierra drifts. This keeps the windshield clear of frost; and the operators do not complain of chilly feet.

C. H. & E. CONSTRUCTION EQUIPMENT



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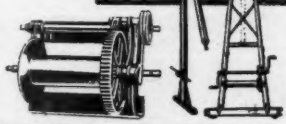

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Location, Construction and Supervision of Airports

The Airport Committee of the American Public Works Ass'n has reported at some length its findings and recommendations relative to airport location, construction and supervision, of which the following is a brief summary:

(1) Airport or air terminal location near the central population area or business district is of prime importance. In larger cities it is desirable to acquire low-cost property where possible for reserve or auxiliary sites for future use. Smaller airports closer in may serve commuter traffic, short haul passengers, etc. To save duplication of construction cost, one airport may serve several smaller communities.

(2) Regulations for spacing of airports should be adopted by the state and federal government. Municipalities and metropolitan districts should establish a key plan giving permanent or tentative locations for major, secondary and minor airports or airports within the area, so that the operating areas would not conflict. Secondary and minor airports should be located so that local flying would not interfere with use of commercial air routes.

(3) Runway lengths at sea-level of from 3500 ft. to 4500 ft. are necessary for feeder-type planes, and of from 5000 ft. to 6000 ft. for long-range domestic operation. A few special airports will require runways up to 10,000 ft. in length for trans-oceanic operation.

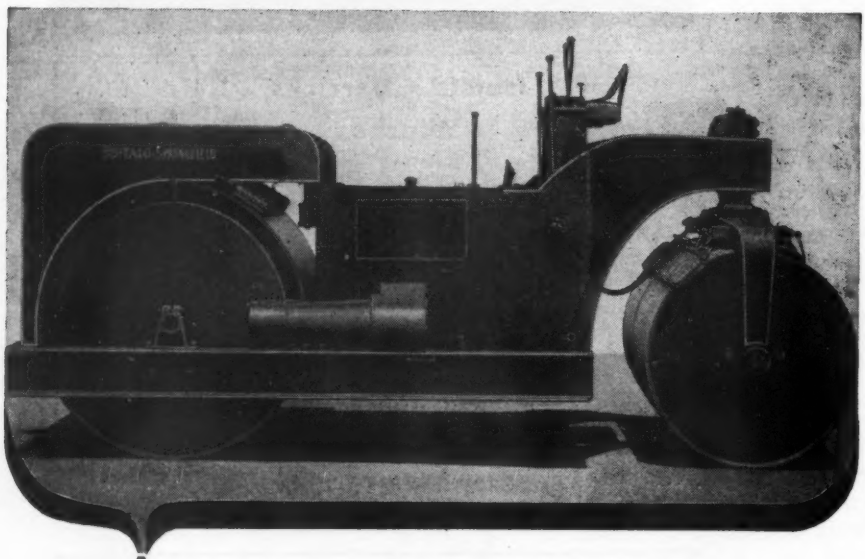
(4) In order to reduce paving costs, careful study should be given to the proposition of planning an airport with one major runway in the most useful direction with respect to wind, and locating the terminal most conveniently with respect to this runway; with the other runways, where required, shortened materially.

(5) The CAA Class I airport (or airpark, as it has been designed by the National Aeronautic Association) can be developed at relatively low cost for private flying and also to serve as community recreational centers. Blighted areas near business districts can be cleared in strips and used for this purpose.

(6) An effort should be made to secure more uniform practice among responsible agencies in connection with standards of rail classification, determination of load-bearing qualities of subgrades and determination of runway pavement thickness.

(7) The construction of landing strips adjacent to public highways or roadside developments may serve small communities where a regular airport could not be justified. Such landing strips should be constructed and maintained by the state.

(8) Privately owned airports used entirely for private flying and the primary training of pilots should be encouraged to operate, with proper supervision by the municipality or state. Considerable sentiment is ex-



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pressed from metropolitan areas that the land should be publicly owned, with the actual operation leased out to private operators.

(9) In the planning of airports, access highways to business districts and important residential areas must be given prime consideration.

(10) A comprehensive federal airport construction program along the general lines suggested by CAA should receive the wholehearted approval of this Association. If a new federal act is required (which is questioned in some quarters), provisions should be made for channeling aid funds directly to municipalities now owning and operating airports. The federal government, through CAA, should continue to operate control towers at all airports serving scheduled commercial airline operations.

(11) The acceptance of federal or state aid for airport construction or maintenance should not necessitate the relinquishment of control by the municipality over airport operation. Present sources of airport revenue should not be diverted.

(12) State aviation authorities should re-enact CAA safety regulations in their own laws. Approaches to airports and turning areas should be adequately protected by zoning regulations. Where necessary air easements should be obtained.

AN ODE TO OUR CRITICS

By R. V. TERRILL
Supt. Streets and Grounds, Willow Run, Mich.

In fighting snow at ten below,
The thing that bothers worst
Is some John Doe who doesn't know
That all things can't come first.

And when your crew has slaved it through
To do the job up proudly
This buzzard finds some small detail
To beef at long and loudly.

For from the sidelines it's no job
To tell the other guy
Just everything that he's done wrong
And how and when and why.

Hindsight is easier than foresight
Some writer has essayed,
Thus all mistakes are plain to see
Just after they've been made.

And we who labor through the snow
Or rain or sleet or fog,
Can look quite awkward to the gent
Beside his fireplace log.

"He should do thus and so!" you cry
Of him who stands the strain,
"*I'd* do it this way," you observe,
Right through your window pane.

Your theories you perhaps could prove,
We've no time to deny it——
You'd also learn what you don't know,
So why in Hell not try it!

* * * * *

But from his perch the arm-chair general
Mighty and conceited,
Still to perfection does the work
That others have completed.

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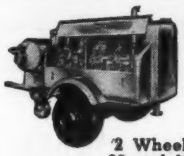

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Opportunities for Sanitary Engineers

Postwar positions likely to be open to returning veterans and how to obtain information concerning them. Release of sanitary engineers from the Army.

THE War Manpower Commission, Procurement and Assignment Service, in April 1945 issued a 19-page pamphlet giving information concerning opportunities for the employment and training of sanitary engineers, and the release of sanitary engineers from the armed services. The following is a very brief abstract of this pamphlet.

Objectives of the Sanitary Engineering Division of the Procurement and Assignment Service

This Division was established in 1943 with the following objectives:

1. To determine the military and civilian needs for sanitary engineers.

2. To develop a roster of all sanitary engineers.

3. To establish a well balanced allocation to meet the military needs without depriving the civilian population of essential sanitation services.

A roster has been developed containing the names of 3,559 sanitary engineers, of whom 1503 are commissioned officers, 959 in the Army, 411 in the U. S. P. H. Service, and 133 in the Navy.

The Division classified 799 of the sanitary engineers as "essential" for civilian health and others as "available" for military service. It is now recommended that the same division be utilized "to provide for an orderly withdrawal of sanitary engineers from the Army, and for their effective utilization in civilian life." State Advisors, in most instances the chief sanitary engineers of the State health departments, who have been appointed by the Division, will advise and counsel with sanitary engineers as they leave the military service and reenter civilian life.

Postwar Needs for Sanitary Engineers

Dr. Thomas Parran, Surgeon General of the U. S. Public Health Service, says the nation needs "nearly 5,000 new water systems and the extension or improvement of some 6,500 others. More than 10,500 communities with a combined population of some 30,000,000 lack adequate sewerage facilities." Sanitation of rural homes and control of milk-borne diseases are other requirements. Trained engineers are needed for these.

"A word of caution. Opportunities in Sanitary Engineering in public services are limited in scope and remuneration. To men thoroughly interested, however, work in sanitary engineering offers genuine satisfaction in being associated with the protection and promotion of the public health by engineering means."

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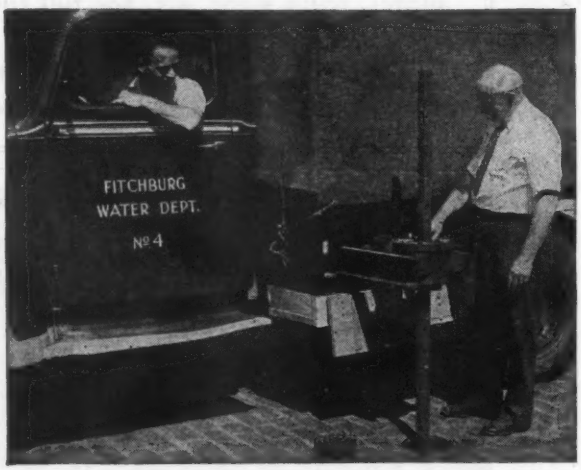

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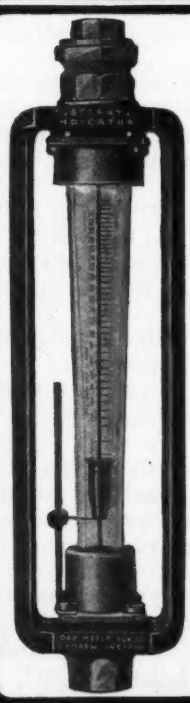

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Jobs for Veterans

If you have been in military service and have completed it satisfactorily and are still qualified to perform the duties of your old job and want to return to it, apply for reemployment within 90 days of your discharge. If you have difficulty in obtaining it, go to the Reemployment Committeeman of your Local Selective Service Board.

If you wish to train for a sanitary engineering position or for promotion to a higher position, and have a service-connected disability or were not over 25 when you entered the service, you can have a one-year course in any subject in any institution approved by the Veterans' Administration, with all expenses paid (not exceeding $500 for an ordinary school year), plus a living allowance of $50 a month, $75 if you have dependents.

Counseling Services

Information concerning employment can be obtained at any of the Army Separation Centers; Navy Civil Readjustment Centers; Veterans' Administration Vocational Advisement Service; more than 8,000 information centers of the Retraining and Reemployment Administration; War Manpower Commission Employment Service; and U. S. Office of Education Guidance and Information Service.

Frequently in the State Sanitary Engineering Division will be found a supervising engineer who consults with local health departments who is also concerned with recruitment and training activities. Such an engineer might function in a liaison capacity with the various counseling agencies. The District Office, U. S. Public Health Service, upon request, may be able to offer assistance in the recruitment, training and counseling program.

Work of the Sanitary Engineer

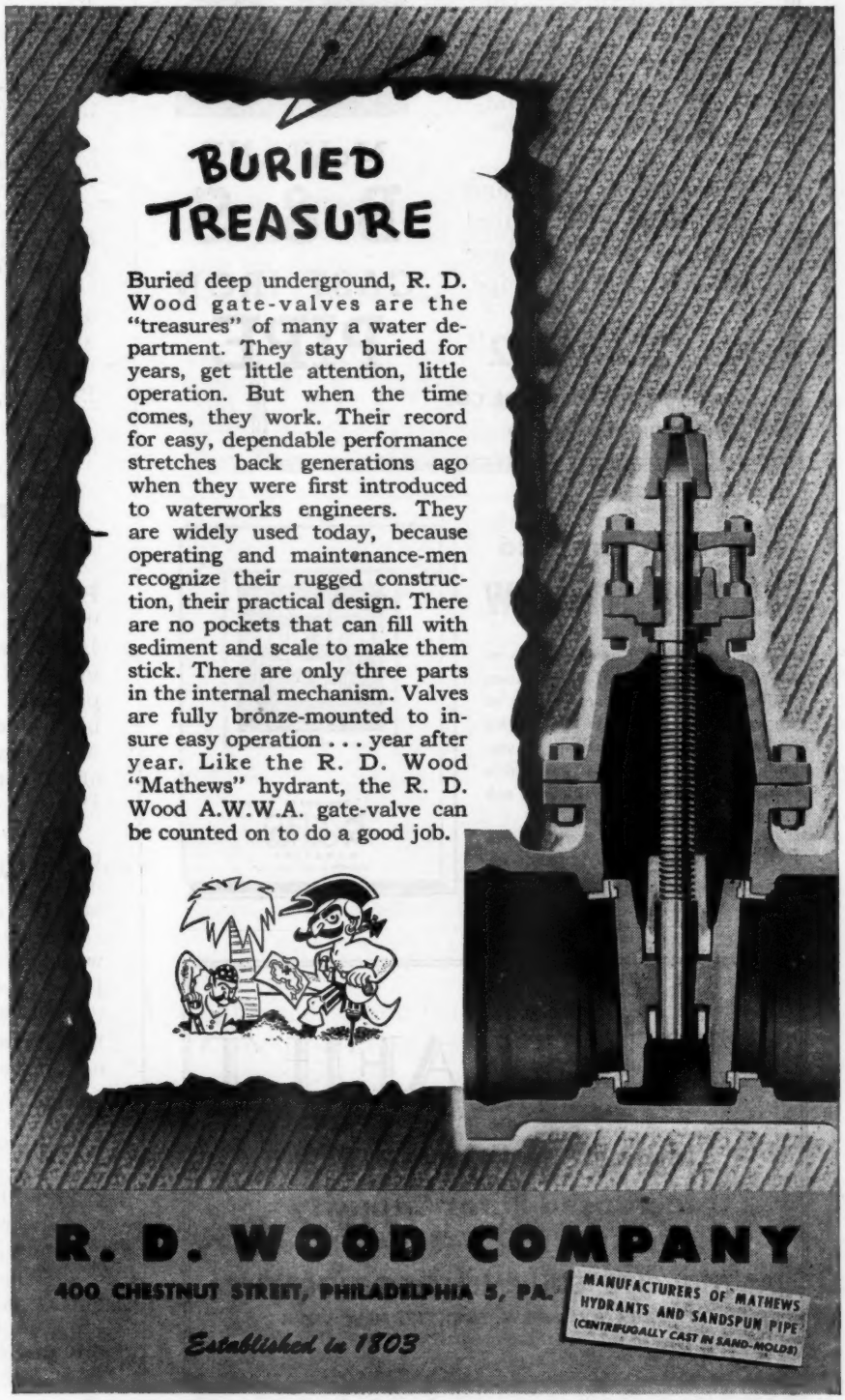
A sanitary engineer is defined as a civil engineer who is informed in sanitary chemistry and bacteriology. He may specialize in the treatment and disposal of industrial and municipal wastes, malaria and pest control, industrial sanitation, rodent control, the production and pasteurization of milk, food sanitation, water supply and treatment.

The U. S. Public Health Service is charged with the control over interstate spread of disease, in which it cooperates in many ways with State health departments. In many types of sanitary engineering, including milk and food sanitation, cooperation is carried out through eleven District Offices.

The sanitary engineer in employ of a State has both regulatory and advisory duties, assisting in enforcing the State laws pertaining to public water supply and sewage disposal, and advising concerning sanitation matters. The Federal Government has few police powers in the field of public health but the State has many, some of which it delegates to counties, cities or towns. "There is an encouraging tendency for a career service for the sanitary engineer in the State service, due to the expansion of merit systems and civil service requirements.

"Many municipal and district sanitary engineers are employed in the operation of water and sewage treatment plants. Too few are at work in municipal, district or county health departments. There should be many more in these departments. . . . There should be extraordinary opportunities for sanitary engineering services in our cities and counties after the war."

Consulting sanitary engineering firms need the services of engineers skilled in sanitary science and also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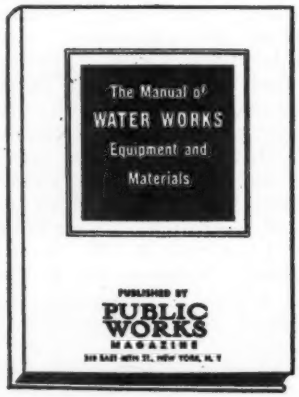

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in structural and hydraulic design. Manufacturers of equipment and devices used in sanitary works employ substantial numbers of engineers in research and development and also as salesmen.

Release of Sanitary Engineers from the Army

The policy has now been approved by the Directing Board, Procurement and Assignment Service, to use the State Advisor mechanism "in reverse" and assist sanitary engineers in obtaining a release from the military forces when the proper time comes, for returning them to civilian work. The War Department has prepared instructions contained in Section III, Circular No. 485, issued December 29, 1944, which provide for the release of officers in the Army who are essential "to public health, welfare or interest." The Committee on Sanitary Engineering, National Research Council, has approved a plan consisting of three steps to furnish justification of the release of such an engineer. This consists of:

1. A summary statement from the employer, showing the need for sanitary engineering services.
2. Certification by the State Advisor that the release of the sanitary engineer is necessary in the interest of public health, and
3. The favorable recommendation from the Office of the Procurement and Assignment Service, War Manpower Commission.

The document is forwarded to the officer concerned, who submits it as justification for his resignation from the Army. It is forwarded through channels to the Adjutant General, Separations Services, Munitions Building, Washington, D. C., for final action.

In all cases the application for release must be initiated by the officer concerned.

Do You *Know* Your Water Supply Is a Safe One?

"During the past year the State Department of Health examined 15 samples of the water supplied to the citizens of this town, and in every case found the 10 ml samples positive for coliform bacteria and failing to meet U. S. Public Health Service standards." This probably did not appear in any town's local paper but would have been true for one town if it had. We will not name the town, but it was one of 382, samples of whose public supplies were examined by the Georgia Department of Public Health last year.

This was the only one which had so bad a record, but 77 supplies failed to meet the U.S.P.H. standards; only one, however, showing 50% or more positive samples, and 19 showing more than 25%.

One fact deserves mention. Of 8 State parks, the water supplies in 4 were below the U.S.P.H. standard, from 16.4% to 55.0% of the samples from each of these showing positive tests, three of these supplies being from springs. Of 5 other state institutions, only one had a similar record.

Of 47 supplies from springs, 11 were below the standard. The deep well supplies, however, did not show up much better—59 out of 275.

Of the 82 surface supplies, all but 6 met the standard requirements. In percentages, 23.6% of the spring supplies were below standard, 21.5% of the deep well, and only 7.3% of the surface supplies.

On the other hand, 86 supplies had a perfect score so far as coliforms is concerned—22.5% of all the supplies. Of the deep well supplies, 19.6% were in this creditable list; 29.3% of the surface supplies, and 12.8% of the springs.

It is the general belief that deep well supplies are safe and surface supplies are not. Yet we find here 21.5%of the deep well supplies failing to meet the standard and only 7.3% of the surface supplies. And, comparing the perfect scores, we find only 19.6% of the deep well supplies in this list, but 29.3% of the surface supplies.

Can the explanation be the same as that for accidents on highways, where more accidents occur on long straight stretches of good road than at dangerous points? That drivers are careful at dangerous points but fail to be so where danger is not apparent?

It would require a detailed investigation of each case to learn the real answer to the question thus raised, but one fact is certain—deep well supplies are not necessarily safe ones. On the other hand, surface supplies, although commonly subject to pollution, can be rendered safe for consumption by proper treatment.

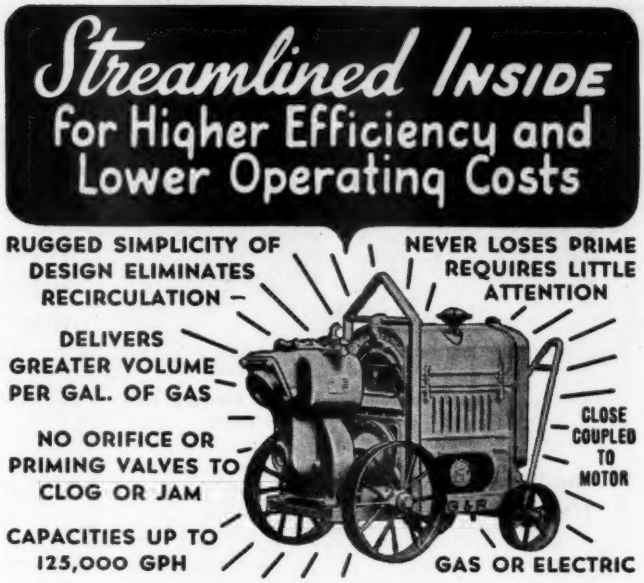
No supply should be assumed to be safe. Its character should be known by frequent reliable analyses—most State boards of health will gladly make these for communities too small to afford a skilled bacteriologist and chemist. The Georgia Dept. of Public Health, in making public the figures upon which the above statements are based, says: "If regular bacteriological examinations of your water supply are not made, you are urged to take advantage of the laboratory services offered by this department and see that samples are submitted at regular and frequent intervals. There is no charge for this service, other than the purchase of a shipping case and the transportation charges on the case to and from the laboratory."

Also N. M. de Jarnette, acting associate director, says: "If your water supply is of questionable quality, you should act at once to provide corrective measures and dependable operation."

Non-Liability of Municipality for Its Refuse Collector's Neglect

Activities on the part of a municipality under legislative delegation to it of the police power of the state are presumed to be governmental. This presumption, however, will be rebutted in any particular case where such activity is shown to be proprietary. Acts of a municipality for the promotion of the health of the inhabitants, under such legislative authority, and where no profit accrues therefrom to the municipality, are acts performed in carrying out a governmental function.

The removal of refuse, trash, garbage and other deleterious matter from the streets and alleys of the municipality, or from private property adjacent thereto, where no profit accrues to the municipality therefrom, is the exercise of a governmental function. The West Virginia Supreme Court of Appeals holds (Hayes v. Town of Cedar Grove, 30 S. E. 2d 726) that a municipal corporation, organized under the laws of West Virginia, is not liable for the negligence of its officers, agents, or servants, occurring while they are engaged in acts directed to be performed by the governing authority of the municipality, in carrying out a purely governmental function. And in employing workers to remove trash and garbage from private property adjacent to streets and alleys, a municipality was held to be exercising a governmental function, and therefore was not liable for negligence of its servants while so employed, or for damages for personal injuries to an employee of the municipality resulting from the negligence of his fellow employees.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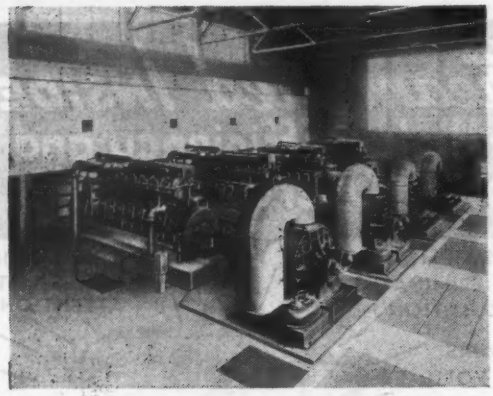


Four gas engines direct connected to blowers, New York City's Tallmans Island plant.

The Sewerage Digest

Abstracts of the main features of all important articles dealing with sewerage and sewage treatment that appeared in the previous month's periodicals.

Loadings of Trickling Filters

Where removal of B.O.D. of 70% or less has been acceptable, high-rate trickling filters have been satisfactory; but where results comparable to those expected from the conventional trickling filter (i.e., a stable effluent with removal of at least 85% of the original B.O.D.) are required, many of these plants have failed. A loading of 250 lb. of B.O.D. per acre-foot of filter bed was about the standard for fixed nozzles, and rotary distributors will produce equivalent effluents at 600 lb. or more. If effluent stability is not required, much higher rates are possible. In many cases the best plan may be to use a roughing filter at 5,000 lb. of B.O.D. or more per acre-foot, and dose its effluent at 600 lb. or more on a second filter, producing a stable effluent.

It seems certain that the recently presented "high-rate" trickling filters will prove to fill an important gap between required B.O.D. removals of from 35% to 40%, which are commonly possible with primary treatment, and the 85% or better which calls for complete treatment.[H24]*

Sludge Bulking Controlled by Chlorination

At an Army activated sludge treatment plant, sludge bulking persisted for several months, in spite of several corrective measures which were tried. Chlorination of return activated sludge was tried, starting with a dosage of 10-16 ppm. After four days, sludge lifted over the final weirs only during peak flows, and at the end of ten days the final effluent was clear and the sludge had good settling properties. Chlorination at a lower rate was continued for an additional ten days, dissolved oxygen being maintained in the aeration tanks. From time to time since then, chlorination has been practiced until threatened bulking was checked.[G11]*

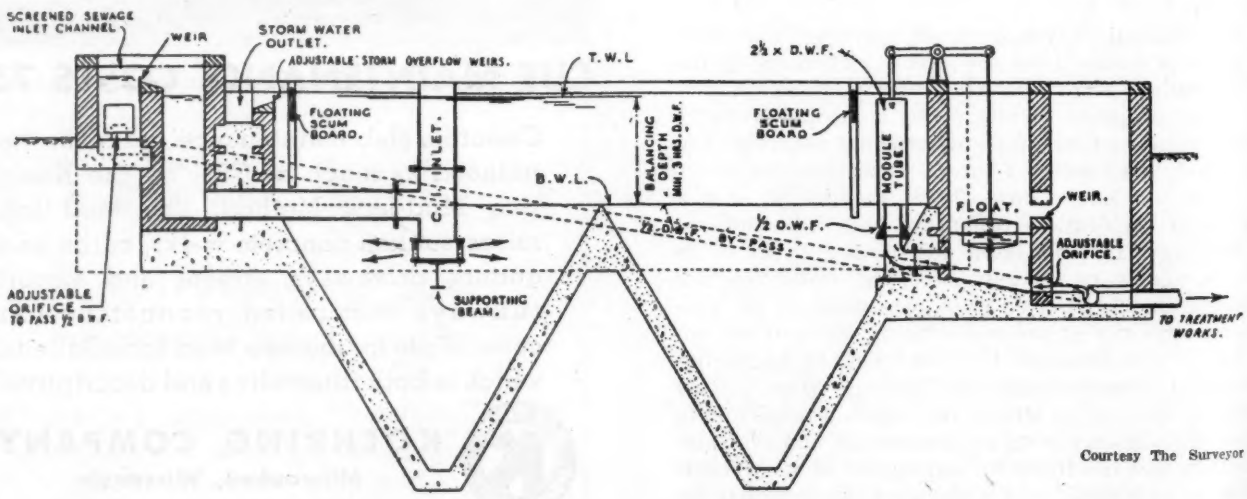
(*See Bibliography in May issue)

Balancing Flow of Sewage

Balancing sewage flow may consist of balancing 1—The effects of storm and wet weather flow; 2—The periodic discharge from pumping stations; 3—The effects of trade wastes; 4—The irregularities of flow that normally occur throughout the average dry-weather day. Balancing flow irregularities by means of slotted weirs, submerged orifice and the like only partially effect this and are detrimental to sedimentation. However, a fair uniformity can be obtained by installing a balancing capacity equal to 3 or 4 hr. dry-weather flow. But balancing rate of flow does not balance the rate of organics leaving the tank. Successive flows with different organics content will not mix unless the sedimentation is poor.

Rate of flow can be balanced by installing a balancing tank to receive temporary excess and feed it back slowly to the sedimentation tank by means of some mechanical device which gives a constant rate of discharge at all heads. Floating discharge arms tend to stick at the joint about which they rotate. Floating weirs must be frictionless and not liable to leak. Instead, the author suggests using a module—"a controlling device and some kind of float-operated gate which maintains a constant head above the orifice . . . so designed that any stoppage due to solids will cause further movement of the gate and a tendency for the gate to cleanse itself without any marked variation of rate of flow occurring." Such a tank as suggested by the author is shown in the illustration.

The height of the float above the orifice in the gauging chamber determines the height of the module tube above



Courtesy The Surveyor

Balancing tank incorporating module, mixing device and storm overflow weirs.

Lithographed on stone by Edward A. Wilson

Illustration shows installation of cast iron flexible joint subaqueous pipe line specified for the required service conditions. How to do it when you get the go-ahead is a problem we are always glad to help out on if it involves pipe design, or recommendations as to pipe and fittings which have successfully met similar problems. To see that our product is correctly specified for the purpose intended is an important function of our sales engineering and technical staffs. Forty-five years' experience as largest producers of cast iron pipe is behind them and always at your service.

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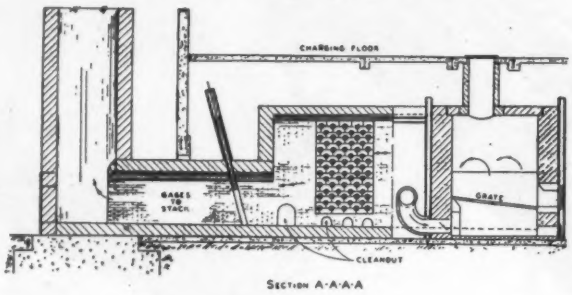

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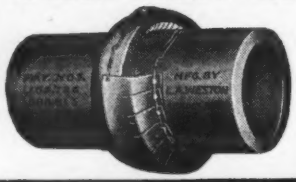

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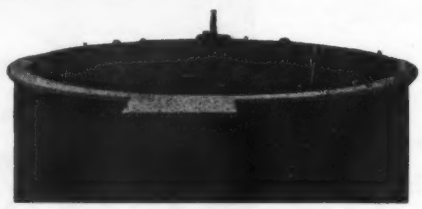

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the outlet cone of the balancing tank. Should the narrow slit between the tube and outlet become choked by solids, the outflow will immediately reduce slightly, causing the level of the float to fall and lifting the module tube until the offending solids are released. Once cleared, the module falls back to its normal position.

Should the flow exceed average dry-weather flow for a sufficient period of time to fill the balancing tank, sewage will spill over the top edge of the module tube and the rate of flow to the float chamber will exceed the rate of flow out of the float chamber through the orifice. The float will then rise, lowering the module tube on to the cone, closing the inlet at the bottom. Once this has happened the upper end of the tube will act as a weir discharging up to three times dry-weather flow. Any excess over this rate of flow will pass over the storm weirs.

A tank capacity of 3 hr. dry-weather flow would probably suffice for most cases, 6 hr. flow for nearly all cases. "Any balancing arrangement that requires a lot of attention or maintenance should not be installed unless it can be proved that it brings advantages that will outweigh the trouble and expenditure it incurs."[D19 & 22]

Cathodic Protection Of Filter Screens

Mechanically cleaned magnetite and sand filters ordinarily are supported on copper screens that rest on steel grating. These often corrode, and because of this, modifications have been adopted, including support of the sand on broken stone, on rubber screens and steel gratings, and on copper screens with wooden gratings. Rutherford, N. J., began operating a silica sand filter with mechanical cleaner in 1941, and had so much trouble from screen corrosion that the filter was in operation only 52% of the time the first year and 75% of the second year. The principal trouble was corrosion of the steel grating and deposit of the products of corrosion in the slots of the copper screens. Late in 1943 the screens and gratings were removed and cleaned with acid, and "Rusta Restor" cathodic protection equipment installed. This consisted of a selenium rectifier unit rated at 8 amperes 24 volts, and five graphite electrodes submerged three feet in the sewage; the negative side of the rectifier being connected to the screens and gratings and the positive side to the electrodes. This started operating Jan. 1, 1944, and since then the filter has operated without any decrease in efficiency. Electric current costs about $15 a year at 1.8 cts per kwh. Cleaning in 1943 cost $1,600.[G10]

Effect of Wastes On Fish Life

Industrial wastes which affect fish life may be classified as 1—Suspensoids which blanket or cover the stream bottom and submerged objects in the stream. 2—Substances having an oxygen demand or oxygen consuming power. 3—Compounds altering the pH of the water. 4—Materials increasing or changing the salinity of the water. 5—Specifically toxic substances. The first destroy the food on which the fish subsist either directly or indirectly. The second does not refer to the B.O.D., which has little effect on fish if the water be aerated continuously. Fish do not thrive in water whose pH is below 6.5 or above 8.4, and pH lower than 5.0 or above 9.0 may be lethal. Most freshwater animals respond unfavorably to sudden changes in osmotic pressure. Some toxic pollutants may not affect the fish directly but may destroy animal or vegetable organisms on which the fish is dependent.[G12]

Variations in Domestic Sewage Flows

There are few data on this, although maximum flow is important in designing both sewer and plant capacities, and minimum flow because of the possibility of septicity in setting tanks and minimum dosing rate requirement on high-rate filters. Based on available information, the author suggests a coefficient of $5/P^{1/6}$ for maximum flows, and $0.2\ P^{1/6}$ for minimum flows, P being the contributing population in thousands. (Note: For a population of over

16,000,000, this would give a minimum greater than the average and a maximum less than the average.)[G13]

Planning
Small Plants

A large proportion of the treatment plants to be built in the future will be provided for serving less than 5,000 population. Such plants should not be designed the same as large plants reduced to a smaller scale, but should be simple in construction details and in operation, compact and foolproof. Since pipes and openings will be smaller, provisions against stoppages should receive special consideration. Since one operator of average ability will have to perform all the duties required by the plant, these, including laboratory control, should be as simple as possible.[H26]

Bibliography of Sewerage Literature

The articles in each magazine are numbered continuously throughout the year, beginning with our January issue.

c, Indicates construction article; *n*, note or short article; *p*, paper before a society (complete or abstract); *t*, technical article.

D *The Surveyor*

April 13

18. Some Notes on the Biological Filtration of Sewage. By John Hurley. Pp. 209-211.

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19. *p*. Engineering Problem of Balancing Rate of Flow and Strength of Sewage. By L. B. Escritt. Pp. 221-222.
20. *p*. Sewerage of Rural Areas. By N. Campbell Little. Pp. 225-226.

April 27

21. *p*. Nottingham's Proposed Sewage Works Extensions. By Granville Berry. Pp. 234-235.
22. *p*. Engineering Problem of Balancing Rate of Flow and Strength of Sewage. By L. B. Escritt. Pp. 235-237.

G *Water Works and Sewerage*

May

12. *p*. Industrial Wastes and Fish Life. By M. M. Ellis. Pp. 171-174.
13. Estimating Variations in Domestic Sewage Flows. By H. M. Gifft. Pp. 175-177.

H *Sewage Works Engineering*

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25. Aeration and Activated Sludge. By Frank A. Marston. Pp. 232-233, 248.
26. "Minimum Sized" Plant Design. By Grant S. Bell. Pp. 234-235.
27. Sheboygan Produces Power for Sewage and Water Plants. By Jake A. Klein. Pp. 236, 246.
28. Equipment Maintenance in Time of War. Pp. 238-239, 242.
29. Disposal of Supernatant Liquor from Sludge Digestion Tanks. Pp. 240-241.

P *Public Works*

May

19. *p*. Locating Infiltration of Salt Water Into a Sewer. P. 34
20. Sewer Construction in Paraguay. By E. N. Fletcher. Pp. 39-40.

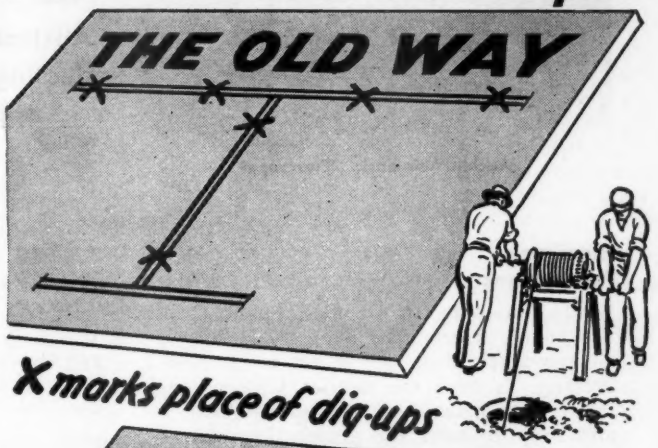
Provisions for Off-Street Parking

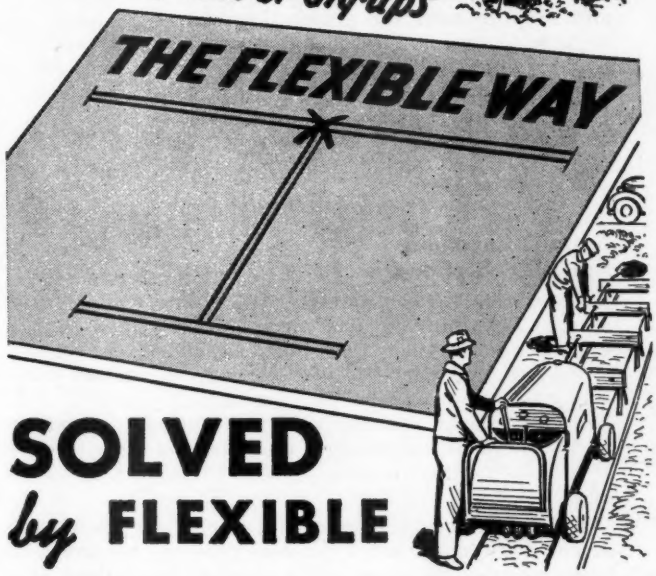
A zoning ordinance adopted by Arlington County, Virginia, a few years ago requires that newly constructed dwellings or apartments must provide one off-street parking space for each family unit. Industrial plants also must provide off-street space for all vehicles employed in their operation plus one space for every two employees. Theaters, auditoriums, hospitals and other places also must provide off-street parking space. Since the ordinance became effective 17,000 residential units have been built, as well as many business centers, and according to county officials excellent results have been secured and streets generally are clear of parked cars where off-street facilities are provided even when curb parking is permitted.

The Massachusetts State Planning Board reports that 27 cities in that state own and operate 49 automobile parking places and that this method of meeting the parking problem is under consideration as a postwar project in Belmont, Chelsea, Framingham, Springfield, Watertown and Adams. The average capacity of the 49 municipal parking lots is 125 cars.

Miami Beach, Florida, voted on April 23 to issue bonds for $300,000 for off-street parking areas.

A PROBLEM...
IN MATHEMATICS
FOR THE *Water Dept.*





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Flexible pipe cleaning service means more than low cost cleaning — it means faster, better jobs with fewer dig-ups and fewer patches in the street.

Flexible's specialized equipment and "know-how" can save money for your city. Call the nearest Flexible representative and get an estimate for cleaning all or part of your pipe line system.

HOW MUCH DOES A DIG-UP COST?

Figure the cost of digging, the cost of back filling, the cost of patching, the cost of detouring traffic, the cost of repaving the street — These are the costs of an unnecessary dig-up in the street.

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When writing, we will appreciate your mentioning PUBLIC WORKS

Racine, Wisconsin, filter room.

The Waterworks Digest

Abstracts of the main features of all important articles dealing with waterworks and water purification that appeared in the previous month's periodicals.

Hurricane Precautions

The Massachusetts Dept. of Public Health, when notified on the morning of Sept. 14, 1944, by the Weather Bureau that a hurricane might reach New England that evening, directed the district sanitary engineers of the department to stand by, fuel all cars, and check equipment and supplies used for disinfecting water. At noon the department was notified that the hurricane was expected by midnight and directed water supply officials throughout the state to fill all standpipes and take other precautions. Little damage was done, but this hurricane and that of 1938 demonstrated the importance of interconnections between municipalities and of having auxiliary units for pumping water.[B19]*

Cross-Connections And Back-Siphonage

The Committee on Sanitary Engineering, National Research Council, investigated dangers under war conditions because of cross-connections and back-siphonage. At one large port city it found 15,076 violations of sanitary principles for the protection of water supply lines, in 319 industrial plants and military establishments, of which 10,142 were back-siphonage. It learned of 20 outbreaks of gastro-intestinal disease, some with several thousand cases.

It made recommendations aimed to eliminate these dangerous conditions and has persuaded several military and other agencies to adjust their policies, regulations and practices. It approved five methods of preventing backflow of non-potable water into potable water supply pipes: 1—Physical separation with a safe air gap. 2—Use of a vacuum breaker on the discharge side of the last separating control valve so that there is no back pressure when the normal flow ceases. 3—Use of a back-flow preventer which operates under pressure and which has a central zone between check valves or equivalent in which the pressure would at all times be maintained less than the pressure on the potable side. 4—Use of double check valves of 6" size or larger as approved by health or water authorities having jurisdiction. 5—Use of single check valves on 2" lines or larger accessible for inspection.[B24]*

Measuring Germicidal Efficiency of Chlorine

Studies made by the Dept. of Sanitary Engineering, Harvard University, of the validity of employing oxidation potential measurements for chlorinated waters for the evaluation of germicidally active chlorine, from both the cysticidal and electro-chemical points of view, led to the following conclusions: Although consistent and characteristic potentials were frequently observed at the cysticidal point for gaseous chlorine and calcium hypochlorite, chloramines, Halazone and succinchlorimide in tap water, irregular potentials and potentials lower than those in tap water were usually obtained in raw waters.

Evaluation of the significance of the oxidation potential of a chlorinated water was not attempted in view of the complicated oxidation-reduction systems that exist in such a water, the uncertainty of the reversibility of these systems, and the presence of dissolved oxygen.

Chlorine compounds and each of the chloramine and chlorimide compounds had their characteristic potentials at cysticidal concentrations, and the cysticidal potential for one compound carried no implication as to the cysticidal efficiency of any other compound.[B27]*

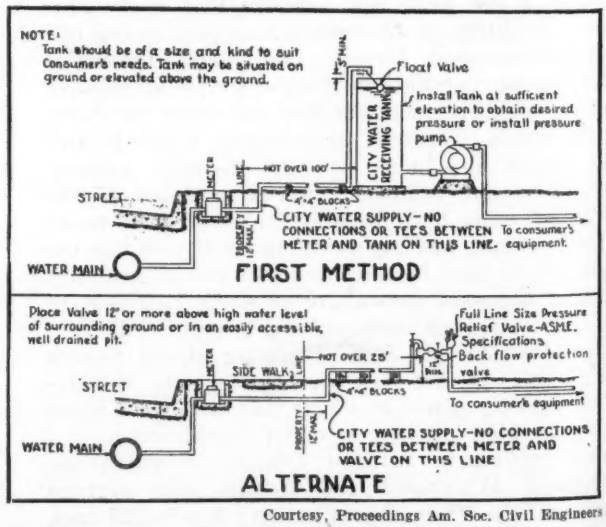
Eliminating Cross Connections

Approximately 50,000 cross connections had been eliminated in Los Angeles, Calif., by Dec. 1, 1944, by one of the most carefully planned and executed programs undertaken by any city. In 1942 the Cross-Connection Control Advisory Committee was founded by joint action of the Boards of Commissioners of the Building and Safety Dept., the Health Dept., the Water and Power Dept., and the Board of Mechanical Engineers, invested with all the police powers of these boards. The policy is to accomplish the objectives through education and cooperation, using its authority and the laws only as a last resort. A seven-point program was adopted:

1. Backflow protection at meter of all services to premises fronting on the harbor and to adjacent industrial and commercial plants.

2. Backflow protection at the wharf for all ship supplies.

3. Segregation of domestic and fire lines as far as possible so that no unprotected cross connections will en-


NOTE:
Tank should be of a size and kind to suit Consumer's needs. Tank may be situated on ground or elevated above the ground.
Float Valve
Install Tank at sufficient elevation to obtain desired pressure or install pressure pump.
CITY WATER RECEIVING TANK
METER
NOT OVER 100'
STREET
4"-4" BLOCKS
CITY WATER SUPPLY-NO CONNECTIONS OR TEES BETWEEN METER AND TANK ON THIS LINE.
To consumer's equipment
WATER MAIN
FIRST METHOD
Place Valve 12" or more above high water level of surrounding ground or in an easily accessible, well drained pit.
Full Line Size Pressure Relief Valve-ASME. Specifications
Back flow protection valve
NOT OVER 25'
SIDE WALK
STREET
4"-4" BLOCKS
To consumer's equipment
CITY WATER SUPPLY-NO CONNECTIONS OR TEES BETWEEN METER AND VALVE ON THIS LINE
WATER MAIN
ALTERNATE

Courtesy, Proceedings Am. Soc. Civil Engineers

Typical arrangement of receiving tank or backflow protection valves, Los Angeles.

*See Bibliography in the May issue.

danger the domestic supply from pierhead, Siamese, or salt-water pump intakes.

4. Elimination of all dangerous plumbing cross connections.

5. Provision for the isolation of all pipe lines carrying processing water.

6. Adoption of color and sign scheme for designation of safe and unsafe water lines.

7. Organization of water foremen on each premise to supervise a unified plan.

All local Army, Navy, Coast Guard, and defense plant organizations are supporting this program. The cost to the consumers of eliminating cross connections has been well over $3,000,000.[K4]

Household Water Softening

During the past six or seven years, household water softening service systems have been developed and now serve customers in about 400 communities. In one type of service a small pressure zeolite unit is installed in a residence, and is replaced with another regenerated unit when the zeolite of the first unit has become exhausted. In another type the softener unit is installed permanently and the exhausted zeolite is replaced from time to time with regenerated.

The unit is a steel cylinder 9″ or 10″ diameter and 42″ high, containing about 1.5 cu. ft. of synthetic gel type zeolite. The price f.o.b. factory is between $20 and $30, including the zeolite. Servicing costs $20 to $24 a year for exchanging zeolite at 28-day intervals, up to $45 to $51 for 7-day service. It is believed probable that the price may come down to $12 to $15 installed, with a service charge of 50 to 75 cts a month.[F23]

Unaccounted-for Water In St. Petersburg

St. Petersburg, Fla., has reduced its unaccounted-for water from 52% to 3% by locating and repairing leaks, and enlisting the help of consumers and city employees in this, and by systematic testing of meters. The water is purchased from a private company and metered through Venturi meters which were checked monthly, recent tests showing only 0.1% error.

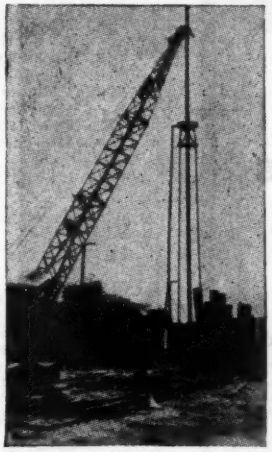
In locating leaks, a zone was cut off and tested each night between 2 and 4 A.M., and the leakes located were repaired the following day. Most leaks were due to poor joints; because of labor shortage, thirteen crews laid pipe with only two inspectors. Many leaks were located by looking for spots of luxuriant growth of grass and weeds, most of the mains being located in parkways. After each extreme change in temperature (often 40° or 50°) special checks for leaks were made.

All services are metered, and an effort is made to remove and test every meter at 5-year intervals. There are 20,068 meters in service. In 1943, 95% of the water pumped into the distribution system was billed.[F27]

Fire Flow Tests Of a Distribution System

"Many of us cannot understand or take the time to work out the capacity of mains by the Hardy Cross method of analysis"; moreover, theoretical studies do not allow for gates unsuspectedly closed, pipe swabs left in the mains, deposits and tuberculation. The answer adopted by Needham, Mass., was fire flow tests. Observations were taken at 70 points throughout the distribution system as follows: The static pressure was read at the hydrant; one 2½ in. hydrant cap was removed and the hydrant opened to full flow; the residual pressure on the main was recorded; the flow from the hydrant was measured by means of a Pitot tube, the inside diameter of the nozzle being recorded. The flow at 20 lb. per sq. in. residual pressure in the mains was calculated for each hydrant and compared with the flow recommended by the National Board of Fire Underwriters. Hydrants whose discharge at 20 lb. fell below that recommended were located on a map of the system and studies made to correct the deficiencies. Endeavor was made to keep pressure losses in pipe lines within 5 lb. per 1,000 ft. of pipe. That means no

Griffin High Pressure Jetting



STEEL

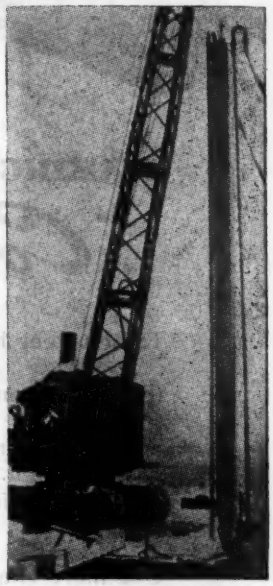
Jetting steel piles with two jet pipes and special rig for accurate location.

WOOD

Wood pile clusters along new boardwalk at Coney Island. Single jet used.

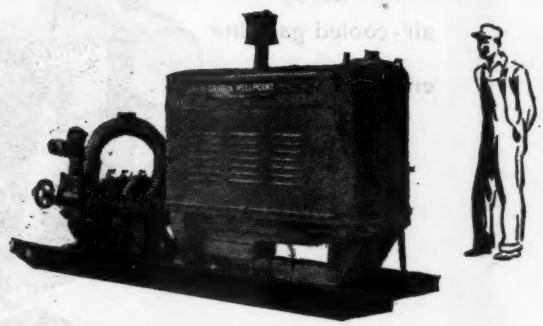
JET DOWN
or
JET UP
ANY TYPE OF
PILE FOUNDATION
with the
GRIFFIN SYSTEM

We can supply you with a single Jetting Pump—or a multiple high pressure pumping system, complete with Heavy Duty Jetting Hose, nozzles, U bends, extra heavy jet pipes and manifolds. You can rent or buy these pumps completely equipped and ready for work. With such Griffin Equipment you can save time, eliminate trouble, whether you want to put piles (or complete pile bents) in —or take them out. All the data you want on this type of work is available in our Catalog. A copy will be sent on request, and questions regarding any particular problem promptly answered.



CONCRETE

Concrete Piles with two jet pipes for 25′ penetration through sand and clay.



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One more vital war job for performance-proved Briggs & Stratton air-cooled gasoline engines.
4 CYCLE
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Their trouble-free performance, easy starting and economy have made Briggs & Stratton engines leaders in the field—"preferred power" everywhere. Only in Briggs & Stratton AIR-COOLED POWER can you get the superior performance made possible by the "know-how" gained through 25 years of continuous production, and consistent leadership in design, engineering, and precision manufacture.
BRIGGS & STRATTON CORPORATION
Milwaukee 1, Wisconsin, U. S. A.

4″ pipe; 8″ pipe for flow up to 500 gpm; 10″ for 1,000 gpm; 12″ for 1,800 gpm, etc. New pipe is laid to reinforce weak spots and loop dead ends, pipe lines are cleaned (they are considering relining some of the larger pipe lines), and some mains are replaced with larger sizes, setting aside each year a definite amount of money for carrying out this program.[B18]

Bibliography of Waterworks Literature

The articles in each magazine are numbered continuously throughout the year, beginning with our January issue.

c. Indicates construction article; *n*, note or short article; *p*, paper before a society (complete or abstract); *t*, technical article.

A *Journal, American Water Works Ass'n*

May

64. The Am. Water Works & Electric Co. Policy Concerning Cross-Connections. By John H. Murdock, Jr. Pp. 419-426.
65. Cross-Connections and Back-Siphonage Connections Under War Conditions. Report by National Research Council. Pp. 427-441.
66. Britain's New National Water Policy. By Henry Berry. Pp. 442-444.
67. Prospects and Promises of the Waterworks Future. By I. M. Glace. Pp. 445-451.
68. Public Ownership of Utilities in Wellsville, N. Y. By E. J. Rowe. Pp. 452-456.
69. Laws and Rules Relating to Water Supply in New Jersey. Pp. 457-469.
70. Policies in Postwar Planning of Water and Sewage Works. By Harry E. Jordan. Pp. 470-481.
71. Operating Experiences at La Verne Softening Plant. By Lee Streicher. Pp. 482-488.

D *The Surveyor*

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6. *p.* Thirty-Five Years of Public Water Supplies. By William Gray. Pp. 203-204.

E *Engineering News-Record*

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7. Prestressing Bands on a Concrete Tank. By John J. Crowley. Pp. 116-118.
8. Increased Span Length on Large Pipe Obtained by Ring-Girder Suspension. By Burton S. Grant. Pp. 119-121.
9. Seven Years of Emergency Expansion Meets Corpus Christi Water Demand. Pp. 122-125.
10. Rural Water Supplies in El Salvador. By H. W. Van Hovenberg and Robert D. Mitchell. Pp. 126-127.
11. Seabee Waterworks in South Pacific Features Many Improvisations. Pp. 128-129.
12. Incrustration of Water Filtration Sand. By Ross A. Thuma. Pp. 130-135.
13. Doubling the Capacity of a Water Plant. By Kenneth Klaffke. Pp. 136-138.
14. Precast Manholes and Multiple-Stem Valves Simplify Distribution System Operation. By R. M. Dowe. Pp. 139-142.

F *Water Works Engineering*

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30. Development of Water Supply Supervision in Illinois. By William J. Downer. Pp. 398-401, 420.
31. *p.* Cross-Connection Elimination in Los Angeles, Calif. By Harry Hayes. Pp. 402-404, 425.

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32. Meters and Metering. By Leonard N. Thompson. P. 469.
33. Education for Sanitary Engineers. By Rolf Eliassen. Pp. 470, 504.
34. Extension of Pension Systems and Social Security. By Dale L. Maffitt. Pp. 472, 506.
35. Lower Yield Estimates Needed. By Charles H. Capen. Pp. 473-474.
36. Legal Control of Use of Ground Water. By C. L. McGuinness. Pp. 475, 508.
37. Softening of Public Water Supplies. By Charles P. Hoover. Pp. 476, 512.
38. Pumps and Power. By Glen C. Boyer. P. 477.
39. Distribution Systems. By W. Victor Weir. Pp. 478, 514.
40. Use of the Radio by Water Works. By Chas. F. Meyerherm. Pp. 479, 516.
41. Meter Reading, Billing and Collecting. By M. F. Hoffman. Pp. 480, 520.
42. New Toledo Supply System. By Geo. N. Schoonmaker. Pp. 481-485, 498.
43. Development of Water Supply Supervision in Illinois. By William J. Downer. Pp. 495-497, 536.

G *Water Works & Sewerage*

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18. What Wartime Metering Has Meant to Naugatuck. By William H. Moody. Pp. 143-145.
19. Cathodic Protection of Steel Surfaces in Contact with Water. By Lee P. Sudrabin. Pp. 147-151.
20. Estimating Flows From Low-Pressure Fire Hydrants. By A. A. Hirsch. Pp. 154-155.
21. A Rapid Demonstration of Metaphosphate Protection. By A. A. Hirsch. P. 156.
22. Why Use Breakpoint? By E. E. Chandler. Pp. 159-160.
23. Selecting Deep-Well Centrifugal Pumps. By Axel O. Fabrin. Pp. 161-167.

J *American City*

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10. Dam Impounds Water of Poudre River. By R. E. Seaman and C. G. Klein. Pp. 92-94.

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M *Water and Sewage*
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8. *p.* Location and Development of Gravel-Wall Wells. By T. L. McManamna. Pp. 48-49, 98.
9. *p.* Centrifugal Pumping Peculiarities. By Robert W. Angus. Pp. 50-51, 96.
10. *p.* Treating a Colored Water Supply at Ottawa, Ont. By H. P. Stockwell, Jr. Pp. 52-53, 88.
11. *p.* Design of Distribution Systems for Small Municipalities. By John G. Powell. Pp. 54, 90.
12. *p.* Water Distribution Systems in Small Municipalities. By Ernest E. W. Oke. Pp. 60, 62.
13. *p.* Filter-Sand Washing Methods. By J. C. Street. Pp. 64, 66, 68.
14. *p.* Anthrafilt Improves Pressure-Filter Operation at New Toronto. By A. H. R. Thomas. Pp. 68, 70.
15. *p.* Postwar Planning of Waterworks. By Harry E. Jordan. Pp. 70, 72, 74, 76, 78, 82.
16. *p.* Maintenance and Operation of a Deep Well Water System. By V. A. McKillop. Pp. 84, 86, 88.

P *Public Works*
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26. Pretreatment of Water for Effective Filtration. By C. R. Cox. Pp. 21-23, 46-49, 52, 54.
27. A Filter Problem and How It Was Solved. By Frank D. Behan. Pp. 26-29.
28. Protecting Municipal Watersheds in Southeastern States. Pp. Carl B. Brown. Pp. 30-34.
29. Meter Maintenance for Small Waterworks Departments. By C. H. Shore. Pp. 35-36, 54.
30. High Chlorine Demand at Waterford, N. Y. By R. G. Yaxley. Pp. 58, 60.

War and Postwar Emergencies

(Continued from page 7)

disbursement made to defray any costs incurred prior to the approval of an application, nor to be used for the acquisition of land.

The funds will be available after July 1.

Public agencies include State governments and their agencies and political subdivisions, such as cities, towns, townships, counties, school districts, water and sewer districts, levee districts, irrigation districts, special tax districts and other duly authorized local governmental units.

The types of eligible public works include sewer, water and sanitation facilities; schools and other educational facilities; hospital and health facilities and other public buildings, such as city halls, court houses, police and fire stations, armories, community buildings, etc.; highways, roads, streets, bridges, viaducts, grade separations and airports, for which other Federal funds are not legally available; parks and other recreational facilities, and miscellaneous public facilities, such as transportation and port facilities, public docks, wharves and piers.

The Division Offices of the Bureau of Community Facilities through which the applications are to be made are located as follows: For New England, N. Y. and N. J.—L. A. Gillett, 101 Park Ave., New York 17, N. Y. For Pa., Md., Del., Va., W. Va. and D. C.—Henry J. Sullivan, Lemon Building, Washington 25, D. C. For N. C., S. C., Ga., Fla., Tenn., Ala. and Miss.—Oliver T. Ray, 20 Fifth St., N. W., Atlanta, Ga. For O., Ky., Ind., Mich., Ill. and Wis.—R. C. Ashton, 1506 Civic Opera Building, 20 N. Wacker Drive, Chicago 6, Ill. For Minn., Ia., Mo., N. D., S. D., Neb. and Kans.—C. W. Anderson, City Hall and County Court House, St. Paul 2, Minn. For Ark., La., Tex. and Okla.—James W. Bradner, Jr., 710 Electric Building, Fort Worth 2, Texas. For Nev., Ariz., Calif., Wyo., Colo., Utah, N. M. and Hawaii—William H. Cheney, 2223 Fulton St., Berkeley, Calif. For Mont., Ida., Wash., Ore. and Alaska—L. R. Durkee, Room 511, 618 Second Ave., Seattle 4, Wash.

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A propeller-type flow meter for water service by the makers of Venturi Meters, Venturi Controllers, Chronoflo Telemeters and a broad line of related water and sewage works equipment.
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Keeping Up With New Equipment

One Modern Unit Collects the Garbage for a Modern City of 6,000

The equipment illustrated here consists of a Gar Wood Load Packer Garbage Body mounted on a K-5 International Truck chassis in operation in Midwest City, Oklahoma.

Mr. Royal Brust, President of the Trustees says the hydraulic packing equipment enables hauling four ordinary truck loads at once; that it is easily operated by three men and refuse is collected from the residential district twice a week and from the business district daily. The truck has a 159-inch wheelbase, averages about 75 miles a day and 10 miles per gallon of gas.

K-5 International Truck mounted with a Gar Wood Load Packer Garbage Body at Mid-West City, Okla.

Koehring Builds ½ Yd. Excavator

Koehring Company
3026 W. Concordia Ave., Milwaukee, Wis.

While war production continues top speed—the 1500th Koehring excavator for the Armed Forces rolled off the assembly line in May—final designs of the company's postwar models and the organization of the postwar service and sales force is rapidly nearing completion.

Already announced is a new postwar ½ yard excavator, the Koehring 205, the first ½ yard machine built by the Milwaukee firm. The 205 has been in production for the Armed Forces since February following extensive tests on a pilot model.

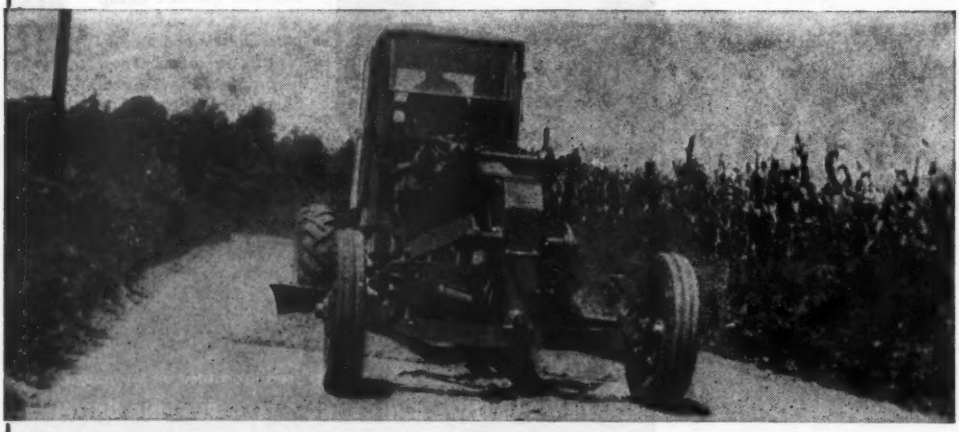
Koehring's distributor organization has been strengthened by the appointments of new dealers in all major construction areas. Just announced by J. F. Robbins, new Koehring sales manager who was recently moved up from a position as vice-president and sales man-

WARCO MOTOR GRADERS

For all-around work—Heavy Construction, Banksloping, Ditching, Blacktop, Maintenance—they'll give you economical and lasting service. All this—

plus

Powerful medium and heavyweight Chain Driven Tandem Drives, whose power wheels assure *positive* traction under extremely adverse conditions. WARCOS stay on the job through toughest going, with enough power to whip the most discouraging and seemingly impossible obstacles!



Easy Hydromotor Control of all blade movements. Instantly available power in hydraulic lines. Such positive and exact blade control that follow-up work is practically eliminated.

Bulletin No. 4300

W. A. RIDDELL CORPORATION, Bucyrus, Ohio

ager of the C. S. Johnson Company, Champaign, Ill., were the appointments of four new Western distributors: Western Machinery, Spokane; Columbia Equipment, Portland and Los Angeles. Eleven Koehring sales and service centers, including a parts warehouse at Sacramento, now blanket the Western construction area.

Other new Koehring distributors are Allied Construction Equipment, St. Louis; Atlantic Tug and Equipment, Syracuse; Florida Equipment, Jacksonville, Miami and Tampa; Frantz Equipment, Philadelphia.

Henry J. McKenzie

Food Machinery Corporation Buys Dayton-Dowd

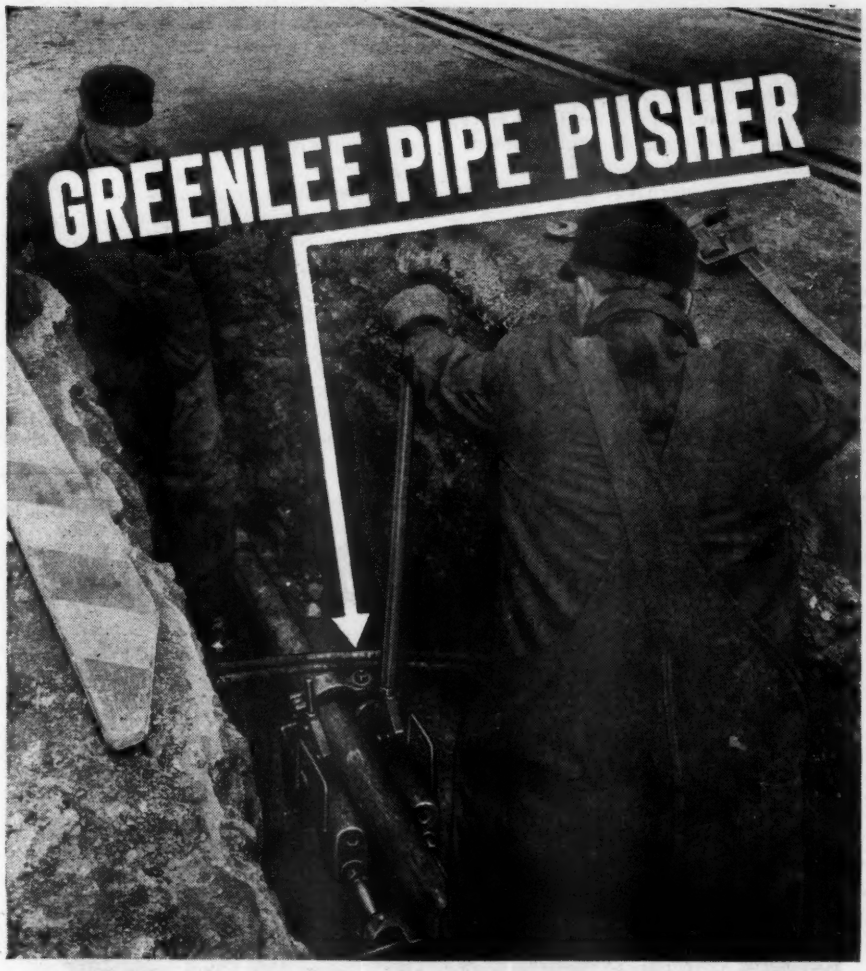
The Dayton-Dowd Company of Quincy, Ill., one of the oldest and largest independent pump companies in the country has been purchased by Food Machinery Corporation.

The firm which had listed assets of more than $1,200,000, will become a branch of Peerless Pump division of Food Machinery Corporation. Clarence M. Frazier will supervise all branches of the division with H. J. McKenzie, who has been Mr. Frazier's assistant, transferring to Quincy to control that branch.

Purchase of the company brings to 15 the number of affiliated plants under the control of Food Machinery Corporation, which services all branches with over-all planning, engineering, research and financing. The Peerless Pump division covers the United States with a sales organization and now has factories in Los Angeles, Quincy and Canton. It is a leading manufacturer in both the horizontal centrifugal pump field as well as in the vertical turbine pump field.

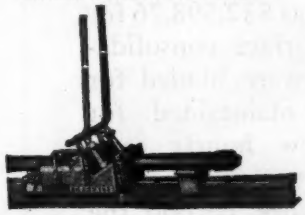
Plans of Food Machinery call for continuation of the present plant in Quincy as Peerless Pump Division, Inc. It will be a branch of the Peerless Pump Division with headquarters in Los Angeles. Other branches and offices of Peerless include Fresno and Bakersfield, California; Canton, Ohio and Plainview, Texas.

All present lines now made by Dayton-Dowd will be continued, augmented, and expanded. Distribution will con-



speeds "under street" telephone cable jobs for Illinois Central System

GREENLEE HYDRAULIC PIPE PUSHER



POWER—pushing pressures range from 6,500 to 150,000 pounds.
EASE—one or two men can easily develop needed pressure. Hydraulic unit does actual pushing.
PORTABILITY—a compact unit, easy to carry to the job and set up.
SPEED—operates at 6 different speeds to match varying soil conditions.
ECONOMY—eliminates cost of extensive digging, requires fewer man-hours.
TWO MODELS—(1) for up to 4-inch pipe; (2) for large drainage ducts, concrete sewer pipe, etc., beyond 4".

In these mighty busy days for the railroads, constant expansion and refinement of communications systems is another key "must".

And this job must be done speedily, well . . . with minimum manpower. Good reasons all why Signal and Telegraph men of the Illinois Central System are equipped with GREENLEE Pushers for installing underground telephone cable pipe.

Illustrated above is one of a series of 30-foot pushes necessary to install 3-inch pipe under busy streets crossing the I. C. right-of-way in Rockford, Illinois . . . with no tedious pavement tear-up, a minimum of trenching, no re-paving.

With a GREENLEE, you, too, can make manpower go further, do the job better . . . whether installing pipe under streets, flooring, lawns, or walks. Write today for free detailed folder S-117. Greenlee Tool Co., Division of Greenlee Bros. & Co., 2046 Columbia Ave., Rockford, Illinois.

Get Ready with Greenlee!

REGISTERED TOOLS
GREENLEE
FOR THE CRAFTSMAN

tinue under the present sales representation.

Mr. Dowd will continue as executive in charge of engineering of the Quincy branch with Rome A. Terwelp and Carl N. Adams remaining in their present capacities of factory manager and assistant manager in charge of the office, respectively.

Warner Vaughn, now a district engineer for Peerless in the East, will be sales manager of the Quincy branch.

Maritime M. Award to Chicago Pump Company

Award of the Maritime M. to the Chicago Pump Company by the United States Maritime Commission in recognition of achievement in engineering and production of Marine pumping equipment is announced by G. D. Bers, President, and Milton Spiegel, Vice President and General Manager of the Company.

Presentation ceremonies were held at the company's main plant at 2348 Wolfram Street, Chicago, on April 21, at 12 noon. Mayor Edward J. Kelly of the city of Chicago was the guest of honor representing the community in an address of welcome and appreciation of this honor coming to a plant in the city of Chicago. L. R. Sanford, Gulf-Great Lakes Regional Director of the U. S. Maritime Commission formally presented the Maritime M. pennant, the Victory Fleet Flag, and merit badges to the company and its employees.

SURFACE CONSOLIDATION *Cuts* ROAD MAINTENANCE COSTS

STATE ROAD #5 ... 9 MILES ... TRAFFIC 200 PER DAY

1939 Blading Cost Before Calcium Chloride $1,183.75 *vs* 1943 Blading Cost After Calcium Chloride $457.95

J. S. Schmit, Engineer of Stearns County, Minnesota tells in "Roads & Streets" how surface consolidation with calcium chloride reduced maintenance costs and improved more roads.

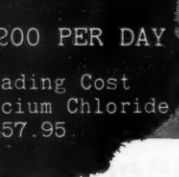
Briefly, at the start the blading cost was $32,598.76 for 750 miles. Three years later, with surface consolidation and calcium chloride 813 miles were bladed for $28,391.64 — 63 miles more road maintained for $4,207.12 less although blading crew hourly rates increased 25c per hour.

The great value in Mr. Schmit's work beyond the remarkable savings was the extended mileage of improved traffic service, which can be duplicated in your own community.

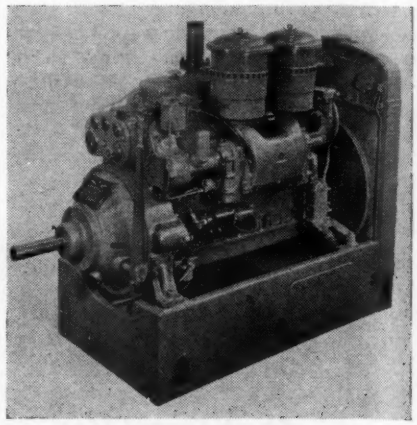
Write for literature on Surface Consolidation and Maintenance. Ask for Bulletin No. 29 which gives facts, figures and methods.

CALCIUM CHLORIDE ASSOCIATION, 4145 Penobscot Building, Detroit 26, Mich.

Dust is the cement in your gravel road
Save it with
CALCIUM CHLORIDE



When you need special information—consult the classified READER'S SERVICE DEPT., pages 73-75



Series 71, Six Cylinder Detroit Diesel Enginie

Two Cycle Diesel Engines

Detroit Diesel Engine Div., General Motors Corp. 13,400 West Outer Dr., Detroit 23, Mich.

Successful application of the two-cycle principle to the Diesel engine by General Motors made possible economical and efficient use of this kind of power in tractors, trucks, buses and road and farm machinery and has resulted in the use of this type of power in many of the heavy-duty war vehicles such as tanks, landing craft, auxiliary and emergency power plants and many other applications.

The series 71 six-cylinder engine, shown above, a product of the Detroit Diesel Division of General Motors, is one of the most popular types of power plants and its application covers a full line of uses to which Diesel power can be put. In units of two, three, four or six cylinders it is available in horsepowers up to 165 H.P. in the six-cylinder job. In addition, GM engineers have developed compact units in which two or four 6-cylinder engines are hooked together on a single drive shaft and under military emergency usage these units develop 450 H.P. and 900 H.P. respectively. The Detroit Diesel Engine Division will market these engines and multiple units through their own distributors and dealers in the postwar era.

Osgood Opens Curtains on Postwar Plans

The Osgood Company Marion, Ohio

Prevue of what the construction, excavating and materials handling fields may expect in the way of Osgood equipment are revealed in the postwar plans announcement by The Osgood Company, pioneer manufacturer of power shovels, cranes, draglines, backhoes and kindred equipment.

Osgood's latest line of power shovels, available as soon as the green light flashes for civilian production, will in-

clude more than a dozen models ranging in capacity from ⅜ to 2½ cubic yards.

One of the featured units of the new line is a lightweight Osgood of ⅜ yard capacity. This shovel will be built of weight-saving materials, in line with consistent strength and durability, and will be crawler-mounted. A second new shovel is the 1-yard capacity, medium weight unit embodying many features conceived and proved during wartime construction.

Next comes a slightly heavier machine, equipped with a new type of crawler mounting and having a capacity of 1¾ yards, and also scheduled for production is a brand new 2 yard machine that will replace the famous Osgood Model 90 which established outstanding performance records before the war.

"Made-to-Order" Water at a Fraction of Distillation Cost

The Dorr Company
570 Lexington Ave., New York, N. Y.

By means of simple controls, processing of water takes place in the D-I System in two steps. The first stage passes raw water over a bed of exchange material that removes calcium and magnesium constituents. Sodium and other metallic salts can also be removed at this stage, if desired. The exchange bed is regenerated with ordinary salt for the removal of calcium and magnesium; where total removal is necessary, acid is used as a regenerant.

In either case, a second step follows, in which the anion exchanger absorbs the acid resulting from the initial step, producing as the final product, water that has been literally "made-to-order."

It is claimed that the unit will deliver mineral-free water that is the chemical equivalent of distilled water in purity, and its output can be regulated as to the exact degree of softness, purity, or mineral content required for a wide variety of specific water uses.

Fields in which the D-I System may profitably be applied are revealed by investigation to include: rayon manufacturing, plating, paper and pulp, brewing and food processing, pharmaceuticals, ceramics, and others. Varied applications are the removal of simple hardness from water, reduction of bicarbonate alkalinity, reduction of total solids, and the recovery of valuable metals from waste water.

Units are now available for use in plants consuming a few gallons of water a day in laboratory use, and for plants where daily water consumption runs into millions of gallons. For full details write The Dorr Company, 570 Lexington Avenue, New York 22, N. Y.

Mechanically Cleaned Bar Screens

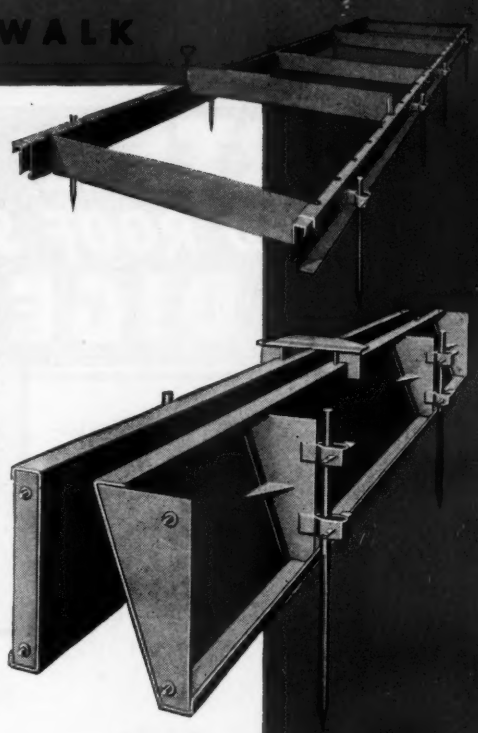
Yeomans Brothers Co.
1433 N. Dayton Street
Chicago, Illinois

Operation of Yeomans screens can be either automatic or manual with open,

HOW TO

improve appearance and save money

ON CONCRETE CURB, GUTTER AND SIDEWALK



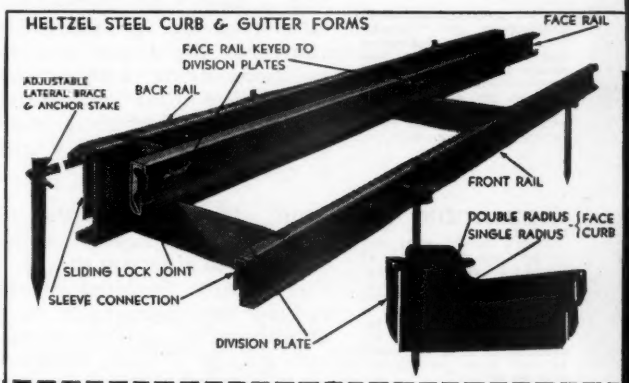
You buy Heltzel Steel Forms once. They stay in service for 20 years or more and each job you set is as uniform as the ones before. The low cost of the equipment per year of service plus the benefits of faster work with the use of forms net substantial savings.

Rigid, self-interlocking Heltzel Steel Forms make the setting and stripping job much easier and faster. No warping, no chipping, no replacements.

Heltzel has been engineering steel forms for 36 years. No matter how complicated or individual your specifications, we can furnish forms for your work.

Purchase of Heltzel Steel Forms for municipal sidewalks, gutters, and curbs enables cities and towns to establish a sound employment program. No other method for setting concrete offers so many advantages.

Write today for engineering data Bulletin A-20-F on Heltzel Steel Forms.



Send me catalog A-20-F
"Steel Forms for Building Concrete Curbs, Curb and Gutters, or Sidewalks"

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(Type of construction usually engaged in)

HELTZEL STEEL FORM & IRON CO. WARREN, OHIO · U. S. A.

Heltzel BUILDS IT BETTER

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- BITUMINOUS PAVING FORMS
- ROAD FORMS (with lip curb and integral curb attachments)
- CURB FORMS
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- CONCRETE BUCKETS
- SUBGRADE TESTERS
- SUBGRADE PLANERS
- TOOL BOXES
- FINISHING TOOLS FOR CONCRETE ROADS

semi-enclosed or fully-enclosed varieties available.

Outstanding feature of the screens is the arrangement of the springsteel cleaning fingers in relation to the fixed bars of the bar rack. Each fixed bar at the bottom is offset, permitting the fingers of the rake head to enter the fixed-bar apertures and make sliding contact with each bar. It is this action which thoroughly cleans the bar screens.

The rake head is held fixed and rigid throughout the full upward travel and then automatically discharges at point of disposal from the screen. On the downward travel the rake head is again locked in the cleaning position. It cannot tilt or climb over screenings. This action is positive and foolproof, and minimum head loss is maintained whether on intermittent or continuous operation.

The screens are offered in several arrangements including angle and vertical types as well as tailor made units to fit unusual requirements.

Wallace & Tiernan War Efforts Committee Christens Ambulance Plane

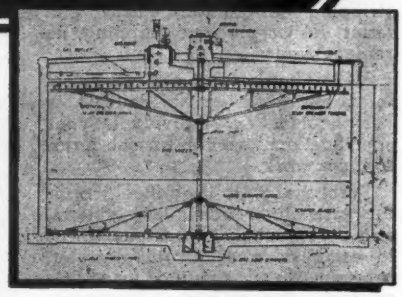
Four members of the Wallace & Tiernan Co. Labor-Management Committee—Mr. Thomas Grant, representing labor; Mr. E. P. Russell, representing management; Miss Grace Vitillo, Secretary and Miss Helen Gerstenmeier, Treasurer of the Committee—have just returned from Oklahoma City, Okla., where, at the plant of the Douglas Aircraft Company, they christened a hospital ambulance plane and five ambulances which were purchased by the sale of War Bonds to Wallace & Tiernan employees in the Sixth War Loan Drive.

Wallace & Tiernan employees christen hospital plane and five ambulances.

Wallace & Tiernan Co., Inc., of Belleville, N. J., manufactures such life-saving equipment as water purification units of all types, pharmaceuticals, special flashing and signalling devices, etc., which have been supplied in large quantities to the Armed Forces throughout the world. It was because of their value in saving lives that the hospital ambulance plane and five ambulances were purchased. It is of interest to note that this plane is equipped with a W&T Flasher unit.

The Douglas Aircraft Company requested that the committee christen the plane so that the ceremony would coincide with the opening of the Seventh War Loan Drive in their plant.

CARTER
FIXED ROOF SLUDGE
DIGESTER



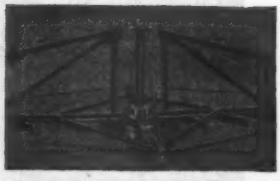
RUGGEDLY constructed, designed and developed to meet the maximum demands of the toughest job in sewage treatment. A unit of tremendous strength with proven ability under continuous heavy load duty. That's the CARTER mechanism for fixed roof sludge digesters.

DESIGN

Careful investigation, sound engineering and thorough testing in both laboratory and field installations have always proved new CARTER developments before they appear on the market. This, coupled with experienced design, assures you the finest in mechanical equipment.

FABRICATION

"Custom built" aptly describes the fabrication of CARTER mixing mechanisms. Variations in size, speed and tank requirements give each particular job a character of its own. Our facilities are such that we are prepared to build equipment to your most exacting requirements.



ERECTION

Simplicity of design, care in fabrication and complete assembly information facilitates proper erection of CARTER mechanisms. This, plus the services of a CARTER Field Engineer to inspect, adjust if necessary, and supervise initial operation guarantees proper installation.

We've placed the emphasis on *tough* for this unit. Perhaps nowhere in the field will you find a revolving mechanism measuring up to CARTER standards. Rigid tests and inspections along with painstaking care in fabrication add up to a more durable, more efficient and a less costly unit to operate.

From drive mechanism to sludge sump scrapers, we've designed to give you the bes Our totally enclosed triple reducer direct connects to a double parallel gearhead motor, giving a slow, positive rotation to the digested material as well as an efficient continuous breakup of all surface scum accumulations. These are only a few of the features. Bulletin 4311 tells the complete story. Write for it today.

RALPH B. CARTER COMPANY
Main Office: HACKENSACK, N. J. New York Office: 53 PARK PL., NEW YORK 7, N.Y.

NEW CATALOGS

Below are described the latest catalogs received by PUBLIC WORKS. All are available free on request to the manufacturers whose names are given.

Sheppard All American Diesels for Low Cost Power

R. H. Sheppard Co., Hanover, Pa., issues 3 folders describing its diesel engines. One refers to the All American generating sets which are built to specific requirements; another to a Sheppard diesel providing power to pump 36,000 gallons per hour with a 30-foot head for a fuel cost of 5¢ per hour. When you are interested in power units these folders will be valuable.

Electro Rust-Proofing System of Cathodic Protection

Electro Rust-Proofing Corporation, Dayton 10, Ohio, has a folder describing how rusting below the water line in elevated steel water tanks, reservoirs, pressure tanks, clarifiers, flocculators, softeners, deep wells and other submerged metals are kept from rusting by an electrical method of preventing corrosion. The folder explains what the method is, what it does, how it is applied, what the original cost is and cost of operation.

New Catalog Describes All De Laval Products

The De Laval Steam Turbine Company has issued a new catalog devoted to the complete line of Steam Turbines, Helical Gears, Centrifugal Pumps, Centrifugal Compressors, Worm Gear Speed Reducers, and IMO Oil Pumps made by that company. In addition to briefly describing the equipment, this catalog tells something of the more noteworthy achievements of the company, particularly in development of high pressure units and the introduction of centrifugal pumps for water works service. Copies of the catalog may be had by asking for Catalog 1181. De Laval Steam Turbine Co., Trenton 2, New Jersey.

New Baker Cable Control Bulldozer Catalog

The Baker Manufacturing Co., Springfield, Ill., has just published a new catalog — No. 849 — containing complete details and specifications on their new line of Cable Controlled Bulldozers and Gradebuilders. Like Baker Hydraulic Bulldozers and Gradebuilders, the new Cable Controlled Models are designed especially for use with Allis-Chalmers Crawler Tractors.

Emphasis in the new Cable Controlled models is placed on ease of operation, low maintenance and adaptability to field conditions. They feature self-energizing, "air-conditioned," cone type clutches and brakes for cooler, smoother operation; and readily accessible brake and clutch adjustments. The Cable Controlled Units are built with single and double drum rear end power control units and single drum front end power control units.

An Informative Folder on Mixers

For the more difficult problems of mixing liquids with liquids, solids and/or gases, this folder records the experience gained through intensive study and analysis. It cautions against confusing "motion" with "mixing" and explains why stirring, when uncontrolled, promotes segregation. Write the Turbo-Mixer Corporation, 247 Park Avenue, New York 17, N. Y., for bulletin 515b.

News about PEOPLE

Builders-Providence, Inc. Appoints a Project Engineer

Milford E. Rogers, recently engineer and superintendent of the Wichita, Kansas Water System and later Acting Director of Service responsible for streets, sewage disposal, water supply and related functions for the city of Wichita, is now associated with Builders-Providence, Inc. (div. of Builders Iron Foundry), Providence, R. I.

In his new connection, Mr. Rogers,

Milford E. Rogers

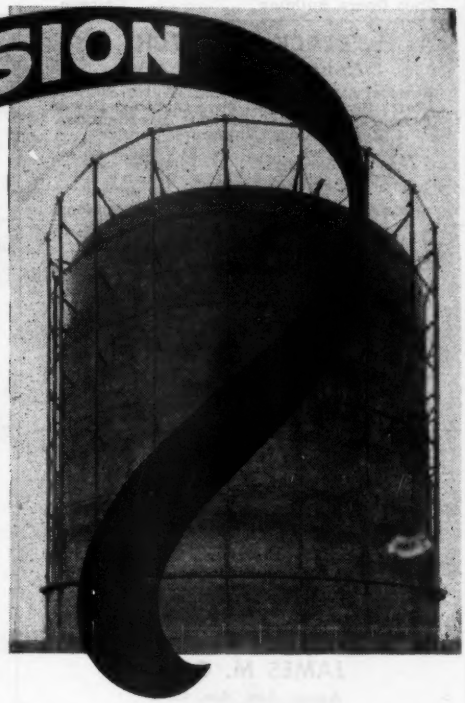
as "Project Engineer," with headquarters in the Providence, R. I., office, will be concerned primarily with a combination of sales and service in connection with the company's specialty of over 50 years in the design and manufacture of flow metering, flow control and related equipment for Water and Sewage Works.

Woodson Southern Sales Manager for National Cast Iron Pipe Division

John T. Woodson, formerly Southeastern Sales Manager for National Cast Iron Pipe Division of James B. Clow & Sons, Birmingham, Alabama, has been appointed Southern Sales Man-

(Continued on page 71)

Is CORROSION Getting the better of your GAS HOLDERS



Are you sure of the condition on the INTERIOR of your gas holders—where corrosion usually does the most damage?

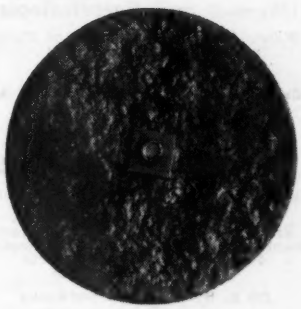
When you avail yourself of the Stacey Brothers Inspection Service, you not only definitely know the inside condition of your holders, but you are also given definite recommendations for combating further progress of corrosion that has already developed. Our recommendations also cover an estimate of the cost to repair damaged parts of your holders. Stacey Brothers Inspection Service can be relied on because it is based upon many years of experience in the design, manufacture, erection, and maintenance of the majority of gas holders located in the United States.

Stacey Brothers Inspection Service is the best "insurance" you can have against the dangers and expense of corrosion, shutdowns, and "accidents." Write for Bulletin I-44.

The STACEY BROS. GAS CONSTRUCTION CO.

One of the Dresser Industries

5535 Vine St., Cincinnati 16, Ohio



Shown above is photo of an actual coupon taken from gas holder. Note the presence of deep corrosion. Stacey Brothers Inspectors thoroughly coupon each holder at all points that are vulnerable to corrosion.

GAS HOLDER INSPECTION SERVICE

Stacey Brothers

ENGINEERS • FABRICATORS
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EXPERIENCE & FACILITIES

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This course given by correspondence is designed to acquaint public works directors and city engineers with the organization and management of their departments. Personnel, planning, equipment, measurement, records, reports, and public relations are emphasized.
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When you need special information—consult the classified READER'S SERVICE DEPT., *pages 73-75*

CONSULTING ENGINEERS

(Continued from page 70)

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HENRY W. TAYLOR

Consulting Engineer

Post War Planning

11 Park Place New York 7, N. Y.

(Continued from page 69)

ager, and will serve both Southeastern and Southern territories.

Mr. Woodson, for many years connected with the Lynchburg Foundry Company, Lynchburg, Virginia, has been associated with National Cast Iron Pipe since 1940.

Clifford E. Alden

Clifford E. Alden Joins Foxboro Engineering Staff

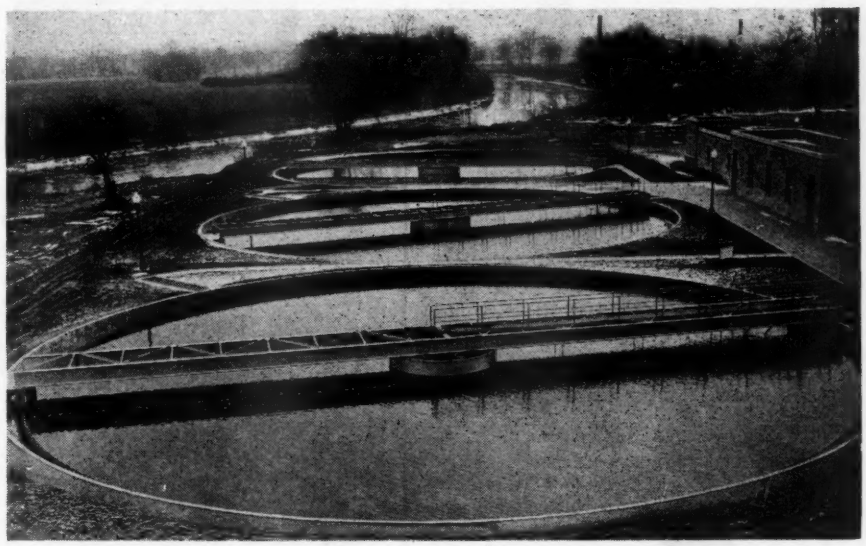
The Foxboro Company, maker of industrial instruments for measurement and control, announces that Mr. Alden has joined its staff and will make his headquarters at the home office, Foxboro, Mass. Mr. Alden, who has had wide experience in the field of municipal engineering, will specialize in the instrumentation of waterworks, sewage disposal plants, garbage incinerators and similar public works, and equipment and facilities of similar nature when operated as parts of industrial plants.

John S. King

New Pump Division Manager for Fairbanks-Morse

R. H. Morse, Jr., Vice President and General Sales Manager of Fairbanks, Morse & Co., Chicago, has appointed John S. King, as Manager of the Company's Pump Division.

Mr. King has had long experience with the Company starting as a student in the Beloit Plant where he assembled and tested pumping equipment and Diesel engines. In 1921 he was transferred to the Indianapolis Works of the Company, building electric motors and generators. A year later he joined the sales force of the Chicago Branch, work-



Hardinge Circular Clarifiers

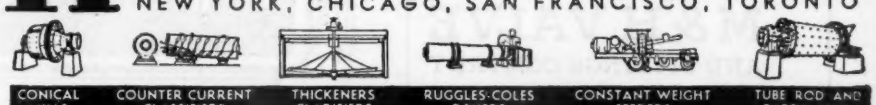
Hardinge Circular Clarifier design incorporates scrapers that efficiently remove settled solids and operate so that a high removal of settleable solids and maximum clarification is assured.

Representative Hardinge installations for sewage and water treatment plants include—

2— 40-ft. dia. Clarifiers at Adrian, Michigan.
3—110-ft. dia. Clarifiers at Fort Wayne, Indiana.
2—100-ft. dia. Clarifiers at Lockport, New York.
2— 70-ft. dia. Clarifiers at Lincoln, Nebraska.

Bulletin 35-B

HARDINGE
COMPANY, INCORPORATED - YORK, PENNSYLVANIA
NEW YORK, CHICAGO, SAN FRANCISCO, TORONTO



CONICAL MILLS | COUNTER CURRENT CLASSIFIERS | THICKENERS CLARIFIERS | RUGGLES-COLES DRYERS | CONSTANT WEIGHT FEEDERS | TUBE ROD AND BATCH MILLS

HYDRANTS and VALVES

Expert workmanship and highest quality materials make M & H products a good investment always. Many years of use in all sections of the country has proved their ruggedness and dependability.

M & H furnishes both regular type A.W.W.A. fire hydrants and special Traffic Model (shown at left) designed to yield at the ground line under impact.

M & H PRODUCTS

Fire Hydrants
Gate Valves
Tapping Valves
Special Castings
Tapping Sleeves
Check Valves
Floor Stands
Extension Stems
Mud Valves
Flap Valves
Sludge Shoes

Write for Catalog No. 34

M&H VALVE AND FITTINGS COMPANY
ANNISTON, ALABAMA

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B. F. Lease

Athey Names Lease President

B. F. Lease was elected to the Presidency of Athey Truss Wheel Co. at a meeting of the Board of Directors in Chicago, April 16.

Mr. Lease, who, since July, 1944, has been Vice-President in charge of Sales, Advertising and Service, succeeds the late C. Kier Davis, killed in an automobile accident in March.

"Ben" Lease started with Athey in 1931 as Special Representative, and from there he advanced rapidly to District Representative; Manager, Service and Research; Manager, Domestic Sales; Vice-President in charge of Sales, Advertising and Service; and now to President. Prior to joining the Athey organization, he served for many years with the Republic Truck Co. and Lynn Manufacturing Co.

Dr. G. E. Miller, B.S., Ph.D. Joins W. A. Taylor & Co.

W. A. Taylor & Co., Baltimore manufacturer of Taylor Comparators for pH, Chlorine and Phosphate Control, announces that Dr. G. E. Miller became actively associated with the Company, effective May 1. While Dr. Miller was one of the original founders of W. A. Taylor & Co., his duties at Edgewood Arsenal as Technical Adviser to the Commanding General, Technical Command, left him little time to devote to the Company he helped form.

Dr. Miller brings to the Taylor staff an unusual background in organic chemistry combined with a wide practical experience in its applications to industry and various Government agencies.

Wm. L. West

Wm. L. West Elected President Automatic Control Co.

At the annual stockholders meeting Feb. 20th, 1945, Mr. Pike, the President stated that 50 years of hard work was long enough for any man and resigned. After extending sincere good wishes to Mr. Pike, the directors elected Mr. W. L. West (formerly treasurer) President; J. S. Williams, Vice-President, and L. H. Mongck, Secretary-Treasurer. The present management plans a steadily expanding line of pump controls to fit all types of applications.

Attention Consulting Engineers!

A Post-War Executive Committee has been appointed by the city of South Bend, Ind., to assist the mayor in the enormous task of planning for the future welfare. The committee invites

(Continued on page 76)

INCINERATION ENGINEERS

NICHOLS ENGINEERING & RESEARCH CORPORATION

60 WALL TOWER NEW YORK, N. Y.

Consultants • Designers • Constructors

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Meter Setting and Testing

431. The most complete catalog we have seen on setting and testing equipment for water meters—exquisitely printed and illustrated 48-page booklet you should have a copy of. Ask Ford Meter Box Co., Wabash, Ind.

Meters, Venturi

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438. "Cast Iron Pipe and Fittings" is a well illustrated 44 page catalog giving full specifications for their complete line of Sand Spun Centrifugal Pipe, Fire Hydrants, Gate Valves, Special Castings, etc. Will be sent promptly by R. D. Wood Co., 400 Chestnut St., Philadelphia 5, Pa.

439. McWane Precaulked Joint Cast Iron Pipe, in all sizes from 1¼ through 12 inches for water and sewerage, equipped with various type of factory-made joints, as well as B. & S. joints. Illustrated booklet issued by McWane Cast Iron Pipe Co., Birmingham, Ala.

Pipe Pusher

444. One-man-operated Hydraulic Pipe Pusher pushes pipe through ground under streets, sidewalks, lawns and other obstacles. Pays for itself in man hours saved on first few jobs. For complete facts and prices, ask for booklet S-117. Greenlee Tool Co., 2042 Columbia Ave., Rockford, Ill.

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448. Asphaltic Sewer Jointing materials are described and instructions for using them are included in a folder. Premoulded Sewer Pipe Belt, a modern method of jointing, a faster installation on the job, and Tufflex, a cold trowelling plastic for Sewer Pipe joints are the products. Write Servicised Products Corp., 6051 W. 65 St., Chicago 38, Ill.

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Pumps and Well Water Systems

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455. Peerless pumps in a variety of types, with oil or water lubrication and any power drive, to pump water from any depth are described and illustrated in new literature that clearly shows their construction and special features. Write Peerless Pump Div., Food Machinery Corp., 301 W Ave. at 26th St., Los Angeles 31, Calif.

456. Oil lubricated turbine pumps with open impellers. Five types of heads available. Specifications and illustrations in new bulletin 6930M-2 issued by Fairbanks, Morse & Co., 600 So. Michigan Ave., Chicago 5, Ill.

457. Centrifugal Pumps of various designs—single-stage, double-suction, split casing; single-stage single-suction; two-stage opposed impeller; three-stage; high-pressure; fire pumps; close-coupled. A bulletin for each type. Dayton-Dowd Co., Quincy, Ill.

Screens

460. Be assured of uninterrupted, constant automatic removal of screenings. Folder 1587 tells how. Gives some of the outstanding advantages of "Straightline Bar Screens" (Vertical and Inclined types). Link-Belt Co., 2045 W. Hunting Park Ave., Philadelphia 40, Pa.

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468. Infilco Accelerators for softening, clarifying and stabilizing. Write today for bulletin 1824. Infilco, Inc., 325 West 25th Pl., Chicago 16, Ill.

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Valves (See Gates, Air Release, etc.)

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495. If you have a water conditioning problem of any kind, write Graver Tank & Mfg. Co., 332 So. Michigan Ave., Chicago 4, Ill., who manufacture all types of conditioning equipment and will be pleased to make recommendations.

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They Don't Have to be Dug Up

There's no digging necessary whenever repair crews are called to service MURDOCK Outdoor Water Service Devices. Fixtures remain in ground; working parts lift out. Repair costs are kept at a minimum, year after year.

Yes, "It Pays to Buy MURDOCK."

THE MURDOCK MFG. & SUP. CO.
426 PLUM STREET
CINCINNATI 2, OHIO

MURDOCK

Known Around the World as the Sign of Exellence in Water Treatment Equipment

The years of experience behind the Roberts nameplate is your assurance that any water rectification problem is expertly handled to your best advantage. As manufacturing and installation engineers, the Roberts organization is equipped to meet your exact needs regardless of the size of the equipment or the complexity of the problem.

Gravity Filters
*
Softening Plants and Equipment
*
Pressure Filters
*
Zeolite Softeners
*
Swimming Pool Recirculating Apparatus
*
Special Water Treatment Equipment

We invite your inquiries

ROBERTS FILTER MFG. CO.
Darby, Pennsylvania

(Continued from page 72)

responsible engineering firms who are interested in preparing plans to communicate with Mayor F. Kenneth Dempsey, City Hall. The projects include a sewage treatment plant and 9 miles of sewers.

Foster D. Snell Inc. Announces New Director of Engineering

David Gordon, recently Chief Engineer for the Interchemical Corp. has joined the staff of Foster D. Snell, Inc., as Director of Engineering.

Mr. Gordon received his B. S. at New York University, and his Master's degree at Columbia University, both in Chemical Engineering. After completion of his graduate study, he carried on research and development work with the Consolidated Edison Company for six years.

Foster Dee Snell, President of Foster D. Snell, Inc., consulting chemists and chemical engineers, recently addressed the Pennsylvania Chapter of the American Institute of Chemists on "The Factors in Detergency."

Col. Gotaas Decorated

Colonel Harold B. Gotaas, Sn. C., Director of the Division of Health Sanitation, Institute of Inter-American Affairs, has been decorated by the Chilean Government with the Order of Merit. Before joining the Army in 1942, Colonel Gotaas was Professor of Sanitary Engineering of the School of Public Health, University of North Carolina.

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